

TECHNICAL SPECIFICATIONS

**Department of Veterans Affairs
Louis Stokes Cleveland VA Medical Center
WADE PARK**

10701 East Boulevard Cleveland, OH 44106

**SMOKE SHELTER
Project No. 541-17-212**

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**DEPARTMENT OF VETERANS AFFAIRS
VHA MASTER SPECIFICATIONS**

**TABLE OF CONTENTS
Section 00 01 10**

| | DIVISION 00 - SPECIAL SECTIONS | PAGES |
|-------------|---|--------------|
| 00 01 10 | Table of Contents | |
| 00 01 15 | Drawing Index | 1 |
| | | |
| | DIVISION 01 - GENERAL REQUIREMENTS | |
| | | |
| 01 00 00 | General Requirements | 21 |
| | OSHA Requirements and Safety And Health Regulations | 7 |
| | Safety and Health During Construction Activities - Attachment 2 | 4 |
| | Safety and Health During Construction Activities - Attachment 3 | 1 |
| | Safety and Health During Construction Activities - Attachment 4 | 2 |
| | Safety and Health During Construction Activities - Attachment 5 | 1 |
| | Safety and Health During Construction Activities - Attachment 6 | 2 |
| | Safety and Health During Construction Activities Enclosure 1 - Infection Control During Construction | 7 |
| | Safety and Health During Construction Activities - Enclosure 1 - Infection Control During Construction - Attachment 1 | 6 |
| | Safety and Health During Construction Activities - Enclosure 1 - Infection Control During Construction - Attachment 2 | 2 |
| | Safety and Health During Construction Activities - Enclosure 1 - Infection Control During Construction - Attachment 3 | 2 |
| | Safety and Health During Construction Activities - Enclosure 1 - Infection Control During Construction - Attachment 4 | 2 |
| 01 23 00 | Alternates | 1 |
| 01 32 16.15 | Project Schedules | 9 |
| 01 33 23 | Shop Drawings, Product Data, and Samples | 5 |
| 01 35 26 | Safety Requirements | 23 |
| | Site Specific Accident Prevention Plan - Sample | 59 |
| 01 42 19 | Reference Standards | 8 |
| 01 45 29 | Testing Laboratory Services | 8 |
| 01 57 19 | Temporary Environmental Controls | 6 |
| 01 74 19 | Construction Waste Management | 6 |
| | | |
| | DIVISION 02 - EXISTING CONDITIONS | |

| | | |
|----------|--|----|
| 02 41 00 | Demolition | 3 |
| | | |
| | DIVISION 03 - CONCRETE | |
| 03 30 00 | Cast-in-place Concrete | 15 |
| | | |
| | DIVISION 07 - THERMAL AND MOISTURE PROTECTION | |
| 07 84 00 | Firestopping | 4 |
| 07 92 00 | Joint Sealants | 11 |
| | | |
| | DIVISION 10 - SPECIALTIES | |
| | | |
| | DIVISION 11 - EQUIPMENT | |
| | | |
| | DIVISION 12 - FURNISHINGS | |
| | | |
| | DIVISION 13 - SPECIAL CONSTRUCTION | |
| 13 34 19 | Pre-engineered Building Systems | 6 |
| | | |
| | DIVISION 26 - ELECTRICAL | |
| 26 05 11 | Requirements for Electrical Installations | 9 |
| 26 05 19 | Low-Voltage Electrical Power Conductors and Cables | 7 |
| 26 05 26 | Grounding and Bonding for Electrical Systems | 6 |
| 26 05 33 | Raceway and Boxes for Electrical Systems | 11 |
| 26 05 41 | Underground Raceway | 9 |
| 26 24 16 | Panelboards | 5 |
| 26 27 26 | Wiring Devices | 4 |
| 26 56 00 | Exterior Lighting | 7 |
| | | |
| | DIVISION 28 - ELECTRONIC SAFETY AND SECURITY | |
| | | |
| | DIVISION 31 - EARTHWORK | |
| 31 20 11 | Earth Moving | 10 |
| | | |
| | DIVISION 32 - EXTERIOR | |
| 32 05 23 | Cement and Concrete for Exterior Improvements | 11 |
| 32 84 00 | Planting Irrigation | 11 |
| 32 90 00 | Plantings | 16 |
| | | |

BID ISSUE
04/24/2015

VAMC WADE PARK
PROVIDE SMOKE SHELTER
PROJECT #:541-17-212

SECTION 00 01 15
DRAWING INDEX

The drawings listed below accompanying this specification form a part of the contract.

| DRAWING NO. | TITLE |
|--------------------------------|--|
| GENERAL | |
| 1-X1 | COVER SHEET |
| CIVIL & LANDSCAPING | |
| 1-V1 | EXISTING CONDITIONS PLAN |
| 1-C1 | DEMOLITION & SITE PREPARATION PLAN AND LAYOUT PLAN |
| 1-C2 | GRADING PLAN AND PAVING PLAN |
| 1-C3 | IRRIGATION PLAN AND PLANTING PLAN |
| 1-C4 | SITE DETAILS |
| ARCHITECTURAL | |
| 1-01 | ARCHITECTURAL ELEVATIONS |
| ELECTRICAL | |
| 1-E1 | ELECTRICAL LEGEND |
| 1-E2 | FIRST FLOOR ELECTRICALPLAN |
| 1-E3 | SECOND FLOOR ELECTRICAL PLAN |

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SECTION 01 00 00
GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 SAFETY REQUIREMENTS

- A. Refer to section 01 35 26, SAFETY REQUIREMENTS for safety and infection control requirements.

1.2 GENERAL INTENTION

- A. Project Description: Project will provide a 240 square foot, fully enclosed, heated, air conditioned and ventilated package smoking shelter unit located on Magnolia Drive to the east of the existing Patient Parking Garage. Project will create required structural retaining walls, concrete paving including walks around and to the smoking shelter and concrete pad necessary to support packaged smoking shelter unit. Project to provide required electrical feed from existing parking garage underground, to shelter slab to provide power for lighting, heating, ventilation and air conditioning provided as part of the smoking shelter unit. Grading, landscaping, irrigation and drainage as required to surrounding areas impacted by project will be part of the project. Site lighting will be required for the project.
- B. Contractor shall completely prepare site for building operations, including demolition and removal of existing structures, and furnish labor and materials and perform work for the Provide Smoke Shelter Project as required by drawings and specifications.
- C. Visits to the site by Bidders may be made only by appointment with the Medical Center Engineering Officer.
- D. Offices of Fredrick, Fredrick & Heller Engineers; Knight & Stolar; Smith Architecture, as Architect-Engineers, will render certain technical services during construction. Such services shall be considered as advisory to the Government and shall not be construed as expressing or implying a contractual act of the Government without affirmations by Contracting Officer or his duly authorized representative.
- E. Before placement and installation of work subject to tests by testing laboratory retained by Department of Veterans Affairs, the Contractor shall notify the COR in sufficient time to enable testing laboratory personnel to be present at the site in time for proper taking and testing of specimens and field inspection. Such prior notice shall be not less than three work days unless otherwise designated by the COR .
- F. All employees of general contractor and subcontractors shall comply with VA security management program and obtain permission of the VA police, be identified by project and employer, and restricted from unauthorized access.

BID ISSUE
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1.3 STATEMENT OF BID ITEMS

- A. BID ITEM I, BASE BID: Contractor to provide all labor, equipment and materials necessary to complete the work as described on the contract documents. Work includes, but is not limited to general construction, alterations, electrical, telecommunications and site work for new smoke shelter. All work to be completed within 210 calendar days from date of receipt of Notice to Proceed.
 - 1. Phase 1 - Submit for review in accordance with project specifications, the Accident Prevention Plan, the Activity Hazard Analyses, shop drawings, project schedules, product data, samples and any other submittals as may be required to complete the work. Phase 1 shall have a duration of 60 days.
 - 2. Phase 2 - Provide on site construction activities to complete all work. Phase 2 shall have a duration of 150 calendar days.
- B. BID ITEM II, BASE BID - DEDUCT ALTERNATE 1: Bid Shall include all work described in Bid Item I, except for the following scope modifications:
 - 1. Omit (3) security cameras.
 - 2. Provide standard concrete in lieu of decorative concrete paving and curb.

1.4 SPECIFICATIONS AND DRAWINGS FOR CONTRACTOR

- A. Drawings and contract documents may be obtained from the website where the solicitation is posted.

1.5 CONSTRUCTION SECURITY REQUIREMENTS

- A. Security Plan:
 - 1. The security plan defines both physical and administrative security procedures that will remain effective for the entire duration of the project.
 - 2. The General Contractor is responsible for assuring that all sub-contractors working on the project and their employees also comply with these regulations.
- B. Security Procedures:
 - 1. General Contractor's employees shall not enter the project site without appropriate badge. They may also be subject to inspection of their personal effects when entering or leaving the project site.
 - 2. Before starting work the General Contractor shall give one week's notice to the Contracting Officer so that security arrangements can be provided for the employees. This notice is separate from any notices required for utility shutdown described later in this section.
 - 3. No photography of VA premises is allowed without written permission of the Contracting Officer.

4. VA reserves the right to close down or shut down the project site and order General Contractor's employees off the premises in the event of a national emergency. The General Contractor may return to the site only with the written approval of the Contracting Officer.

C. Key Control:

1. The General Contractor shall provide duplicate keys and lock combinations to the Contracting officers representative (COR) COR for the purpose of security inspections of every area of project including tool boxes and parked machines and take any emergency action.
2. All construction doors/access doors must use VA key system and remain locked at all times from the corridor/exterior side.

D. Motor Vehicle Restrictions

1. Vehicle authorization request shall be required for any vehicle entering the site and such request shall be submitted 24 hours before the date and time of access. Access shall be restricted to picking up and dropping off materials and supplies.
2. No parking is available at Medical Center. For contractors and contractor commuter vehicles shall be parked off-site.

1.6 OPERATIONS AND STORAGE AREAS

- A. The Contractor shall confine all operations (including storage of materials) on Government premises to areas authorized or approved by the Contracting Officer. The Contractor shall hold and save the Government, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance.
- B. Temporary buildings (e.g., storage sheds, shops, offices) and utilities may be erected by the Contractor only with the approval of the Contracting Officer and shall be built with labor and materials furnished by the Contractor without expense to the Government. The temporary buildings and utilities shall remain the property of the Contractor and shall be removed by the Contractor at its expense upon completion of the work. With the written consent of the Contracting Officer, the buildings and utilities may be abandoned and need not be removed.
- C. The Contractor shall, under regulations prescribed by the Contracting Officer, use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by the Contracting Officer. When materials are transported in prosecuting the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or local law or regulation. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads.
- D. Working space and space available for storing materials shall be as determined by the COR .

BID ISSUE
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PROJECT #:541-17-212

- E. Workmen are subject to rules of Medical Center applicable to their conduct.
- F. Execute work so as to interfere as little as possible with normal functioning of Medical Center and Patient Parking Garage vehicluar entrance/exit and pedestrian crosswalk. Keep roads clear of construction materials, debris, standing construction equipment and vehicles at all times.
 - 1. Do not store materials and equipment in other than assigned areas.
 - 2. Provide unobstructed access to Medical Center areas required to remain in operation.
- G. Utilities Services: Where necessary to cut existing pipes, electrical wires, conduits, cables, etc., of utility services, or of fire protection systems or communications systems (except telephone), they shall be cut and capped at suitable places where shown; or, in absence of such indication, where directed by COR . All such actions shall be coordinated with the COR or Utility Company involved:
 - 1. Whenever it is required that a connection fee be paid to a public utility provider for new permanent service to the construction project, for such items as water, sewer, electricity, gas or steam, payment of such fee shall be the responsibility of the Government and not the Contractor.
- H. Phasing:
 - 1. The Medical Center must maintain its operation 24 hours a day 7 days a week. Therefore, any interruption in service must be scheduled and coordinated with the COR to ensure that no lapses in operation occur. It is the CONTRACTOR'S responsibility to develop a work plan and schedule detailing, at a minimum, the procedures to be employed, the equipment and materials to be used, the interim life safety measure to be used during the work, and a schedule defining the duration of the work with milestone subtasks. The work to be outlined shall include, but not be limited to:
 - 2. To insure such executions, Contractor shall furnish the COR with a schedule of approximate dates on which the Contractor intends to accomplish work in each specific area of site, building or portion thereof. In addition, Contractor shall notify the COR two weeks in advance of the proposed date of starting work in each specific area of site, building or portion thereof. Arrange such dates to insure accomplishment of this work in successive phases mutually agreeable to COR and Contractor.

- I. Construction Fence: Before construction operations begin, Contractor shall provide a chain link construction fence, 2.1m (seven feet) minimum height, around the construction area indicated on the drawings. Provide gates as required for access with necessary hardware, including hasps and padlocks. Fasten fence fabric to terminal posts with tension bands and to line posts and top and bottom rails with tie wires spaced at maximum 375mm (15 inches). Bottom of fences shall extend to 25mm (one inch) above grade. Remove the fence when directed by COR .
- J. When a building and/or construction site is turned over to Contractor, Contractor shall accept entire responsibility including upkeep and maintenance therefore:
 - 1. Contractor shall maintain a minimum temperature of 4 degrees C (40 degrees F) at all times, except as otherwise specified.
 - 2. Contractor shall maintain in operating condition existing fire protection and alarm equipment. In connection with fire alarm equipment, Contractor shall make arrangements for pre-inspection of site with Fire Department or Company (Department of Veterans Affairs or municipal) whichever will be required to respond to an alarm from Contractor's employee or watchman.
- K. Utilities Services: Maintain existing utility services for Medical Center at all times. Provide temporary facilities, labor, materials, equipment, connections, and utilities to assure uninterrupted services. Where necessary to cut existing water, steam, gases, sewer or air pipes, or conduits, wires, cables, etc. of utility services or of fire protection systems and communications systems (including telephone), they shall be cut and capped at suitable places where shown; or, in absence of such indication, where directed by COR .
 - 1. No utility service such as water, gas, steam, sewers or electricity, or fire protection systems and communications systems may be interrupted without prior approval of COR. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished, work on any energized circuits or equipment shall not commence without a detailed work plan, the Medical Center Director's prior knowledge and written approval. Refer to specification Sections 26 05 11.
 - 2. Contractor shall submit a request to interrupt any such services to COR, in writing, 7 days in advance of proposed interruption. Request shall state reason, date, exact time of, and approximate duration of such interruption.
 - 3. Contractor will be advised (in writing) of approval of request, or of which other date and/or time such interruption will cause least inconvenience to operations of Medical Center . Interruption time approved by Medical Center may occur at other than Contractor's normal working hours.
 - 4. Major interruptions of any system must be requested, in writing, at least 15 calendar days prior to the desired time and shall be performed as directed by the COR .

5. In case of a contract construction emergency, service will be interrupted on approval of COR. Such approval will be confirmed in writing as soon as practical.
6. Whenever it is required that a connection fee be paid to a public utility provider for new permanent service to the construction project, for such items as water, sewer, electricity, gas or steam, payment of such fee shall be the responsibility of the Government and not the Contractor.
- L. Abandoned Lines: All service lines such as wires, cables, conduits, ducts, pipes and the like, and their hangers or supports, which are to be abandoned but are not required to be entirely removed, shall be sealed, capped or plugged at the main, branch or panel they originate from. The lines shall not be capped in finished areas, but shall be removed and sealed, capped or plugged in ceilings, within furred spaces, in unfinished areas, or within walls or partitions; so that they are completely behind the finished surfaces.
- M. To minimize interference of construction activities with flow of Medical Center traffic, comply with the following:
 1. Keep roads, walks and entrances to grounds, to parking and to occupied areas of buildings clear of construction materials, debris and standing construction equipment and vehicles.
 2. Method and scheduling of required cutting, altering and removal of existing roads, walks and entrances must be approved by the COR.
- N. Coordinate the work for this contract with other construction operations as directed by COR. This includes the scheduling of traffic and the use of roadways,

1.7 ALTERATIONS

- A. Survey: Before any work is started, the Contractor shall make a thorough survey with the COR in which alterations occur and areas which are anticipated routes of access, and furnish a report, signed by both, to the contracting officer. This report shall list rooms and spaces:
 1. Existing condition and types of resilient flooring, doors, windows, walls and other surfaces not required to be altered throughout affected areas of building.
 2. Existence and conditions of items such as plumbing fixtures and accessories, electrical fixtures, equipment, venetian blinds, shades, etc., required by drawings to be either reused or relocated, or both.
 3. Shall note any discrepancies between drawings and existing conditions at site.
 4. Shall designate areas for working space, materials storage and routes of access to areas within buildings where alterations occur and which have been agreed upon by Contractor and COR.

- B. Any items required by drawings to be either reused or relocated or both, found during this survey to be nonexistent, or in opinion of COR , to be in such condition that their use is impossible or impractical, shall be furnished and/or replaced by Contractor with new items in accordance with specifications which will be furnished by Government. Provided the contract work is changed by reason of this subparagraph B, the contract will be modified accordingly, under provisions of clause entitled "DIFFERING SITE CONDITIONS" (FAR 52.236-2) and "CHANGES" (FAR 52.243-4 and VAAR 852.236-88).
- C. Re-Survey: Thirty days before expected partial or final inspection date, the Contractor and COR together shall make a thorough re-survey of the areas of buildings involved. They shall furnish a report on conditions then existing, of resilient flooring, doors, windows, walls and other surfaces as compared with conditions of same as noted in first condition survey report:
 - 1. Re-survey report shall also list any damage caused by Contractor to such flooring and other surfaces, despite protection measures; and, will form basis for determining extent of repair work required of Contractor to restore damage caused by Contractor's workmen in executing work of this contract.
- D. Protection: Provide the following protective measures:
 - 1. Wherever existing roof surfaces are disturbed they shall be protected against water infiltration. In case of leaks, they shall be repaired immediately upon discovery.
 - 2. Temporary protection against damage for portions of existing structures and grounds where work is to be done, materials handled and equipment moved and/or relocated.
 - 3. Protection of interior of existing structures at all times, from damage, dust and weather inclemency. Wherever work is performed, floor surfaces that are to remain in place shall be adequately protected prior to starting work, and this protection shall be maintained intact until all work in the area is completed.

1.8 DISPOSAL AND RETENTION

- A. Materials and equipment accruing from work removed and from demolition of buildings or structures, or parts thereof, shall be disposed of as follows:
 - 1. Reserved items which are to remain property of the Government are identified by attached tags or noted on drawings or in specifications as items to be stored. Items that remain property of the Government shall be removed or dislodged from present locations in such a manner as to prevent damage which would be detrimental to re-installation and reuse. Store such items where directed by COR .
 - 2. Items not reserved shall become property of the Contractor and be removed by Contractor from Medical Center .

3. Items of portable equipment and furnishings located in rooms and spaces in which work is to be done under this contract shall remain the property of the Government. When rooms and spaces are vacated by the Department of Veterans Affairs during the alteration period, such items which are NOT required by drawings and specifications to be either relocated or reused will be removed by the Government in advance of work to avoid interfering with Contractor's operation.
4. PCB Transformers : The Contractor shall be responsible for disposal of the Polychlorinated Biphenyl (PCB) transformers . The transformers shall be taken out of service and handled in accordance with the procedures of the Environmental Protection Agency (EPA) and the Department of Transportation (DOT) as outlined in Code of Federal Regulation (CFR), Titled 40 and 49 respectively. The EPA's Toxic Substance Control Act (TSCA) Compliance Program Policy Nos. 6-PCB-6 and 6-PCB-7 also apply. Upon removal of PCB transformers for disposal, the "originator" copy of the Uniform Hazardous Waste Manifest (EPA Form 8700-22), along with the Uniform Hazardous Waste Manifest Continuation Sheet (EPA Form 8700-22A) shall be returned to the Contracting Officer who will annotate the contract file and transmit the Manifest to the Medical Center's Chief.
 - a. Copies of the following listed CFR titles may be obtained from the Government Printing Office:
 - 1) 40 CFR 261 Identification and Listing of Hazardous Waste
 - 2) 40 CFR 262 Standards Applicable to Generators of Hazardous Waste
 - 3) 40 CFR 263 Standards Applicable to Transporters of Hazardous Waste
 - 4) 40 CFR 761 PCB Manufacturing, Processing, Distribution in Commerce, and use Prohibitions
 - 5) 49 CFR 172 Hazardous Material tables and Hazardous Material Communications Regulations
 - 6) 49 CFR 173 Shippers - General Requirements for Shipments and Packaging
 - 7) 49 CRR 173 Subpart A General
 - 8) 49 CFR 173 Subpart B Preparation of Hazardous Material for Transportation
 - 9) 49 CFR 173 Subpart J Other Regulated Material; Definitions and Preparation
 - 10) TSCA Compliance Program Policy Nos. 6-PCB-6 and 6-PCB-7

1.9 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS

- A. The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) on or adjacent to the work site, which are not to be removed and which do not unreasonably interfere with the work required under this contract. The Contractor shall only remove trees when specifically authorized to do so, and shall avoid damaging vegetation that will remain in place. If any limbs or branches of trees are broken during contract performance, or by the careless operation of equipment, or by workmen, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the Contracting Officer.
- B. The Contractor shall protect from damage all existing improvements and utilities at or near the work site and on adjacent property of a third party, the locations of which are made known to or should be known by the Contractor. The Contractor shall repair any damage to those facilities, including those that are the property of a third party, resulting from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the work. If the Contractor fails or refuses to repair the damage promptly, the Contracting Officer may have the necessary work performed and charge the cost to the Contractor.
- C. Refer to Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS, for additional requirements on protecting vegetation, soils and the environment. Refer to Articles, "Alterations", "Restoration", and "Operations and Storage Areas" for additional instructions concerning repair of damage to structures and site improvements.

1.10 RESTORATION

- A. Remove, cut, alter, replace, patch and repair existing work as necessary to install new work. Except as otherwise shown or specified, do not cut, alter or remove any structural work, and do not disturb any ducts, plumbing, steam, gas, or electric work without approval of the r COR . Existing work to be altered or extended and that is found to be defective in any way, shall be reported to the COR before it is disturbed. Materials and workmanship used in restoring work, shall conform in type and quality to that of original existing construction, except as otherwise shown or specified.
- B. Upon completion of contract, deliver work complete and undamaged. Existing work (walls, ceilings, partitions, floors, mechanical and electrical work, lawns, paving, roads, walks, etc.) disturbed or removed as a result of performing required new work, shall be patched, repaired, reinstalled, or replaced with new work, and refinished and left in as good condition as existed before commencing work.
- C. At Contractor's own expense, Contractor shall immediately restore to service and repair any damage caused by Contractor's workmen to existing piping and conduits, wires, cables, etc., of utility services or of fire protection systems and communications systems (including telephone) which are not scheduled for discontinuance or abandonment.

- D. Expense of repairs to such utilities and systems not shown on drawings or locations of which are unknown will be covered by adjustment to contract time and price in accordance with clause entitled "CHANGES" (FAR 52.243-4 and VAAR 852.236-88) and "DIFFERING SITE CONDITIONS" (FAR 52.236-2).

1.11 PROFESSIONAL SURVEYING SERVICES

- A. A registered professional land surveyor or registered civil engineer whose services are retained and paid for by the Contractor shall perform services specified herein and in other specification sections. The Contractor shall certify that the land surveyor or civil engineer is not one who is a regular employee of the Contractor, and that the land surveyor or civil engineer has no financial interest in this contract.

1.12 LAYOUT OF WORK

- A. The Contractor shall lay out the work from Government established base lines and bench marks, indicated on the drawings, and shall be responsible for all measurements in connection with the layout. The Contractor shall furnish, at Contractor's own expense, all stakes, templates, platforms, equipment, tools, materials, and labor required to lay out any part of the work. The Contractor shall be responsible for executing the work to the lines and grades that may be established or indicated by the Contracting Officer. The Contractor shall also be responsible for maintaining and preserving all stakes and other marks established by the Contracting Officer until authorized to remove them. If such marks are destroyed by the Contractor or through Contractor's negligence before their removal is authorized, the Contracting Officer may replace them and deduct the expense of the replacement from any amounts due or to become due to the Contractor.
- B. Establish and plainly mark center lines for each building and corner of column lines and/or addition to each existing building, lines for each gravesite control monument, and such other lines and grades that are reasonably necessary to properly assure that location, orientation, and elevations established for each such structure and/or addition, roads, parking lots, are in accordance with lines and elevations shown on contract drawings.
- C. Following completion of general mass excavation and before any other permanent work is performed, establish and plainly mark (through use of appropriate batter boards or other means) sufficient additional survey control points or system of points as may be necessary to assure proper alignment, orientation, and grade of all major features of work. Survey shall include, but not be limited to, location of lines and grades of footings, exterior walls, center lines of columns in both directions, major utilities and elevations of floor slabs:

1. Such additional survey control points or system of points thus established shall be checked and certified by a registered land surveyor or registered civil engineer. Furnish such certification to the COR before any work (such as footings, floor slabs, columns, walls, utilities and other major controlling features) is placed.
- D. During progress of work, and particularly as work progresses from floor to floor, Contractor shall have line grades and plumbness of all major form work checked and certified by a registered land surveyor or registered civil engineer as meeting requirements of contract drawings. Furnish such certification to the COR before any major items of concrete work are placed. In addition, Contractor shall also furnish to the COR certificates from a registered land surveyor or registered civil engineer that the following work is complete in every respect as required by contract drawings.
 1. Lines of each building and/or addition.
 2. Elevations of bottoms of footings and tops of floors of each building and/or addition.
 3. Lines and elevations of sewers and of all outside distribution systems.
 4. Lines of grave plot documentation.
 5. Lines of elevations of all swales and interment areas.
 6. Lines and elevations of roads, streets and parking lots.
- E. Whenever changes from contract drawings are made in line or grading requiring certificates, record such changes on a reproducible drawing bearing the registered land surveyor or registered civil engineer seal, and forward these drawings upon completion of work to COR .
- F. Upon completion of the work, the Contractor shall furnish the COR one electronic copy and reproducible drawings at the scale of the contract drawings, showing the finished grade on the grid developed for constructing the work, including burial monuments and fifty foot stationing along new road centerlines. These drawings shall bear the seal of the registered land surveyor or registered civil engineer.
- G. The Contractor shall perform the surveying and layout work of this and other articles and specifications in accordance with the provisions of Article "Professional Surveying Services".

1.13 AS-BUILT DRAWINGS

- A. The contractor shall maintain two full size sets of as-built drawings which will be kept current during construction of the project, to include all contract changes, modifications and clarifications.
- B. All variations shall be shown in the same general detail as used in the contract drawings. To insure compliance, as-built drawings shall be made available for the COR review, as often as requested.
- C. Contractor shall deliver two approved completed sets of as-built drawings to the COR within 15 calendar days after each completed phase and after the acceptance of the project by the COR.

D. Paragraphs A, B, & C shall also apply to all shop drawings.

1.14 USE OF ROADWAYS

- A. For hauling, use only established public roads and roads on Medical Center property and, when authorized by the COR, such temporary roads which are necessary in the performance of contract work. Temporary roads shall be constructed and restoration performed by the Contractor at Contractor's expense. When necessary to cross curbing, sidewalks, or similar construction, they must be protected by well-constructed bridges.
- B. When certain buildings (or parts of certain buildings) are required to be completed in advance of general date of completion, all roads leading thereto must be completed and available for use at time set for completion of such buildings or parts thereof.

1.15 TEMPORARY USE OF MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Use of new installed mechanical and electrical equipment to provide heat, ventilation, plumbing, light and power will be permitted subject to written approval and compliance with the following provisions:
 - 1. Permission to use each unit or system must be given by COR in writing. If the equipment is not installed and maintained in accordance with the written agreement and following provisions, the COR will withdraw permission for use of the equipment.
 - 2. Electrical installations used by the equipment shall be completed in accordance with the drawings and specifications to prevent damage to the equipment and the electrical systems, i.e. transformers, relays, circuit breakers, fuses, conductors, motor controllers and their overload elements shall be properly sized, coordinated and adjusted. Installation of temporary electrical equipment or devices shall be in accordance with NFPA 70, National Electrical Code, (2014 Edition), Article 590, *Temporary Installations*. Voltage supplied to each item of equipment shall be verified to be correct and it shall be determined that motors are not overloaded. The electrical equipment shall be thoroughly cleaned before using it and again immediately before final inspection including vacuum cleaning and wiping clean interior and exterior surfaces.
 - 3. Units shall be properly lubricated, balanced, and aligned. Vibrations must be eliminated.
 - 4. Automatic temperature control systems for preheat coils shall function properly and all safety controls shall function to prevent coil freeze-up damage.
 - 5. The air filtering system utilized shall be that which is designed for the system when complete, and all filter elements shall be replaced at completion of construction and prior to testing and balancing of system.

6. All components of heat production and distribution system, metering equipment, condensate returns, and other auxiliary facilities used in temporary service shall be cleaned prior to use; maintained to prevent corrosion internally and externally during use; and cleaned, maintained and inspected prior to acceptance by the Government. Boilers, pumps, feedwater heaters and auxiliary equipment must be operated as a complete system and be fully maintained by operating personnel. Boiler water must be given complete and continuous chemical treatment.
- B. Prior to final inspection, the equipment or parts used which show wear and tear beyond normal, shall be replaced with identical replacements, at no additional cost to the Government.
- C. This paragraph shall not reduce the requirements of the mechanical and electrical specifications sections.
- D. Any damage to the equipment or excessive wear due to prolonged use will be repaired replaced by the contractor at the contractor's expense.

1.16 TEMPORARY TOILETS

- A. Provide where directed, (for use of all Contractor's workmen) ample temporary sanitary toilet accommodations with suitable sewer and water connections; or, when approved by COR , provide suitable dry closets where directed. Keep such places clean and free from flies, and all connections and appliances connected therewith are to be removed prior to completion of contract, and premises left perfectly clean.

1.17 AVAILABILITY AND USE OF UTILITY SERVICES

- A. The Government shall make all reasonably required amounts of utilities available to the Contractor from existing outlets and supplies, as specified in the contract. The amount to be paid by the Contractor for chargeable electrical services shall be the prevailing rates charged to the Government. The Contractor shall carefully conserve any utilities furnished without charge.
- B. The Contractor, at Contractor's expense and in a workmanlike manner, in compliance with code and as satisfactory to the Contracting Officer, shall install and maintain all necessary temporary connections and distribution lines, and all meters required to measure the amount of electricity used for the purpose of determining charges. Before final acceptance of the work by the Government, the Contractor shall remove all the temporary connections, distribution lines, meters, and associated paraphernalia and repair restore the infrastructure as required.
- C. Contractor shall install meters at Contractor's expense and furnish the Medical Center a monthly record of the Contractor's usage of electricity as hereinafter specified.
- D. Electricity (for Construction and Testing): Furnish all temporary electric services.

1. Obtain electricity by connecting to the Medical Center electrical distribution system. The Contractor shall meter and pay for electricity required for electric cranes and hoisting devices, electrical welding devices and any electrical heating devices providing temporary heat. Electricity for all other uses is available at no cost to the Contractor.

1.18 TESTS

- A. Pre-test mechanical and electrical equipment and systems and make corrections required for proper operation of such systems before requesting final tests. Final test will not be conducted unless pre-tested.
- B. Conduct final tests required in various sections of specifications in presence of an authorized representative of the Contracting Officer. Contractor shall furnish all labor, materials, equipment, instruments, and forms, to conduct and record such tests.
- C. Mechanical and electrical systems shall be balanced, controlled and coordinated. A system is defined as the entire system which must be coordinated to work together during normal operation to produce results for which the system is designed. For example, air conditioning supply air is only one part of entire system which provides comfort conditions for a building. Other related components are return air, exhaust air, steam, chilled water, refrigerant, hot water, controls and electricity, etc. Another example of a system which involves several components of different disciplines is a boiler installation. Efficient and acceptable boiler operation depends upon the coordination and proper operation of fuel, combustion air, controls, steam, feedwater, condensate and other related components.
- D. All related components as defined above shall be functioning when any system component is tested. Tests shall be completed within a reasonable period of time during which operating and environmental conditions remain reasonably constant and are typical of the design conditions.
- E. Individual test result of any component, where required, will only be accepted when submitted with the test results of related components and of the entire system.

1.19 INSTRUCTIONS

- A. Contractor shall furnish Maintenance and Operating manuals (hard copies and electronic) and verbal instructions when required by the various sections of the specifications and as hereinafter specified.

- B. Manuals: Maintenance and operating manuals and one compact disc (four hard copies and one electronic copy each) for each separate piece of equipment shall be delivered to the COR coincidental with the delivery of the equipment to the job site. Manuals shall be complete, detailed guides for the maintenance and operation of equipment. They shall include complete information necessary for starting, adjusting, maintaining in continuous operation for long periods of time and dismantling and reassembling of the complete units and sub-assembly components. Manuals shall include an index covering all component parts clearly cross-referenced to diagrams and illustrations. Illustrations shall include "exploded" views showing and identifying each separate item. Emphasis shall be placed on the use of special tools and instruments. The function of each piece of equipment, component, accessory and control shall be clearly and thoroughly explained. All necessary precautions for the operation of the equipment and the reason for each precaution shall be clearly set forth. Manuals must reference the exact model, style and size of the piece of equipment and system being furnished. Manuals referencing equipment similar to but of a different model, style, and size than that furnished will not be accepted.
- C. Instructions: Contractor shall provide qualified, factory-trained manufacturers' representatives to give detailed training to assigned Department of Veterans Affairs personnel in the operation and complete maintenance for each piece of equipment. All such training will be at the job site. These requirements are more specifically detailed in the various technical sections. Instructions for different items of equipment that are component parts of a complete system, shall be given in an integrated, progressive manner. All instructors for every piece of component equipment in a system shall be available until instructions for all items included in the system have been completed. This is to assure proper instruction in the operation of inter-related systems. All instruction periods shall be at such times as scheduled by the COR and shall be considered concluded only when the COR is satisfied in regard to complete and thorough coverage. The contractor shall submit a course outline with associated material to the COR for review and approval prior to scheduling training to ensure the subject matter covers the expectations of the VA and the contractual requirements. The Department of Veterans Affairs reserves the right to request the removal of, and substitution for, any instructor who, in the opinion of the COR, does not demonstrate sufficient qualifications in accordance with requirements for instructors above.

1.20 CONSTRUCTION SIGN

- A. Provide a Construction Sign where directed by the COR. All wood members shall be of framing lumber. Cover sign frame with 0.7 mm (24 gage) galvanized sheet steel nailed securely around edges and on all bearings. Provide three 100 by 100 mm (4 inch by 4 inch) posts (or equivalent round posts) set 1200 mm (four feet) into ground. Set bottom of sign level at 900 mm (three feet) above ground and secure to posts with through bolts. Make posts full height of sign. Brace posts with 50 x 100 mm (two by four inch) material as directed.

- B. Paint all surfaces of sign and posts two coats of white gloss paint. Border and letters shall be of black gloss paint, except project title which shall be blue gloss paint.
- C. Maintain sign and remove it when directed by the COR .

| | | No. of Photographs |
|-----------|--------------|--------------------|
| Up to | \$250,000 | 50 to 100 |
| " " | \$500,000 | 100 to 150 |
| " " | \$1,000,000 | 150 to 200 |
| " " | \$2,000,000 | 200 to 250 |
| " " | \$5,000,000 | 250 to 300 |
| " " | \$10,000,000 | 300 to 400 |
| More than | \$10,000,000 | 400 to 500 |

1.21 PHOTOGRAPHIC DOCUMENTATION

- A. During the construction period through completion, provide photographic documentation of construction progress and at selected milestones including electronic indexing, navigation, storage and remote access to the documentation, as per these specifications. The commercial photographer or the subcontractor used for this work shall meet the following qualifications:
1. Demonstrable minimum experience of three (3) years in operation providing documentation and advanced indexing/navigation systems including a representative portfolio of construction projects of similar type, size, duration and complexity as the Project.
 2. Demonstrable ability to service projects throughout North America, which shall be demonstrated by a representative portfolio of active projects of similar type, size, duration and complexity as the Project.
- B. Photographic documentation elements:
1. Each digital image shall be taken with a professional grade camera with minimum size of 6 megapixels (MP) capable of producing 200x250mm (8 x 10 inch) prints with a minimum of 2272 x 1704 pixels and 400x500mm (16 x 20 inch) prints with a minimum 2592 x 1944 pixels.
 2. Indexing and navigation system shall utilize actual AUTOCAD construction drawings, making such drawings interactive on an on-line interface. For all documentation referenced herein, indexing and navigation must be organized by both time (date-stamped) and location throughout the project.
 3. Documentation shall combine indexing and navigation system with inspection-grade digital photography designed to capture actual conditions throughout construction and at critical milestones. Documentation shall be accessible on-line through use of an internet connection. Documentation shall allow for secure multiple-user access, simultaneously, on-line.

4. Before construction, the building pad, adjacent streets, roadways, parkways, driveways, curbs, sidewalks, landscaping, adjacent utilities and adjacent structures surrounding the building pad and site shall be documented. Overlapping photographic techniques shall be used to insure maximum coverage. Indexing and navigation accomplished through interactive architectural drawings. If site work or pad preparation is extensive, this documentation may be required immediately before construction and at several pre-determined intervals before building work commences.
5. Construction progress for all trades shall be tracked at pre-determined intervals, but not less than once every thirty (30) calendar days ("Progressions"). Progression documentation shall track both the exterior and interior construction of the building. Exterior Progressions shall track 360 degrees around the site and each building. Interior Progressions shall track interior improvements beginning when stud work commences and continuing until Project completion.
6. As-built condition of pre-foundation utilities and site utilities shall be documented prior to pouring footers, placing concrete and/or backfilling. This process shall include all underground and in-slab utilities within the building(s) envelope(s) and utility runs in the immediate vicinity of the building(s) envelope(s). This may also include utilities enclosed in slab-on-deck in multi-story buildings. Overlapping photographic techniques shall be used to insure maximum coverage. Indexing and navigation accomplished through interactive site utility plans.
7. As-built conditions of mechanical, electrical, plumbing and all other systems shall be documented post-inspection and pre-insulation, sheet rock or dry wall installation. This process shall include all finished systems located in the walls and ceilings of all buildings at the Project. Overlapping photographic techniques shall be used to insure maximum coverage. Indexing and navigation accomplished through interactive architectural drawings.
8. As-built conditions of exterior skin and elevations shall be documented with an increased concentration of digital photographs as directed by the COR in order to capture pre-determined focal points, such as waterproofing, window flashing, radiused steel work, architectural or Exterior Insulation and Finish Systems (EIFS) detailing. Overlapping photographic techniques shall be used to insure maximum coverage. Indexing and navigation accomplished through interactive elevations or elevation details.
9. As-built finished conditions of the interior of each building including floors, ceilings and walls shall be documented at certificate of occupancy or equivalent, or just prior to occupancy, or both, as directed by the COR. Overlapping photographic techniques shall be used to insure maximum coverage. Indexing and navigation accomplished through interactive architectural drawings.

10. Miscellaneous events that occur during any Contractor site visit, or events captured by the Department of Veterans Affairs independently, shall be dated, labeled and inserted into a Section in the navigation structure entitled "Slideshows," allowing this information to be stored in the same "place" as the formal scope.
 11. Customizable project-specific digital photographic documentation of other details or milestones. Indexing and navigation accomplished through interactive architectural plans.
 12. Monthly (29 max) exterior progressions (360 degrees around the project) and slideshows (all elevations and building envelope). The slideshows allow for the inclusion of Department of Veterans Affairs pictures, aerial photographs, and timely images which do not fit into any regular monthly photopath.
 13. Weekly (21 Max) Site Progressions - Photographic documentation capturing the project at different stages of construction. These progressions shall capture underground utilities, excavation, grading, backfill, landscaping and road construction throughout the duration of the project.
 14. Regular (8 max) interior progressions of all walls of the entire project to begin at time of substantial framed or as directed by the COR through to completion.
 15. Detailed Exact-Built of all Slabs for all project slab pours just prior to placing concrete or as directed by the COR .
 16. Detailed Interior exact built overlapping photos of the entire building to include documentation of all mechanical, electrical and plumbing systems in every wall and ceiling, to be conducted after rough-ins are complete, just prior to insulation and or drywall, or as directed by COR .
 17. Finished detailed Interior exact built overlapping photos of all walls, ceilings, and floors to be scheduled by COR prior to occupancy.
 18. In event a greater or lesser number of images than specified above are required by the COR , adjustment in contract price will be made in accordance with clause entitled "CHANGES" (FAR 52.243-4 and VAAR 852.236-88).
- C. Images shall be taken by a commercial photographer and must show distinctly, at as large a scale as possible, all parts of work embraced in the picture.
- D. Coordination of photo shoots is accomplished through COR . Contractor shall also attend construction team meetings as necessary. Contractor's operations team shall provide regular updates regarding the status of the documentation, including photo shoots concluded, the availability of new Progressions or Exact-Built viewable on-line and anticipated future shoot dates.
- E. Contractor shall provide all on-line domain/web hosting, security measures, and redundant server back-up of the documentation.
- F. Contractor shall provide technical support related to using the system or service.

BID ISSUE
04/24/2015

VAMC WADE PARK
PROVIDE SMOKE SHELTER
PROJECT #:541-17-212

- G. Upon completion of the project, final copies of the documentation (the "Permanent Record") with the indexing and navigation system embedded (and active) shall be provided in an electronic media format, typically a DVD or external hard-drive. Permanent Record shall have Building Information Modeling (BIM) interface capabilities. On-line access terminates upon delivery of the Permanent Record.

---E N D---

OSHA Requirements and Safety and Health Regulations

PART 1 - OSHA Requirements

1.1 General

- A. Contractors are required to comply with the Occupational Safety and Health Act of 1970. This will include the safety and health standard found in Code of Federal Regulations (CFR) 1910 and 1926. Copies of those standards can be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20420.
- B. In addition, Contractor will be required to comply with other applicable Medical Center policies and safety regulations. These policies and regulations will be presented to the Contractor at the pre-construction meeting. Each of the Contractor's employees will be required to read the statement of policies and regulations, and sign an acknowledgment that such policies and regulations are understood. Signed acknowledgment will be returned to the Contract Officer Technical Representative.
- C. Contractors involved with the removal, alteration or disturbance of asbestos-type insulation or materials or lead paint will be required to comply strictly with the regulations found in CFR 1910.1001 and the appropriate Environmental Protection Agency (EPA) lead regulations regarding disposal of asbestos or lead paint. Assistance in identifying asbestos or lead can be requested from the Medical Center's Industrial Hygienist and the COR.
- D. Contractors entering locations of asbestos contamination or lead paint residue (i.e., pipe, basements, walls, windows) shall be responsible for providing respiratory protection to their employees and ensuring respirators are worn in accordance with the Occupational Safety and Health Administration (OSHA) [CFR 1910.1001(g)]. Asbestos-or lead paint-contaminated areas shall be defined on project drawings. The minimum equipment requirements will be a half-mask air-purifying respirator equipped with high efficiency filters and disposable coveralls, or as determined by air monitoring results.
- E. Contractor, along with other submittals and at least two weeks prior to bringing any materials on-site, must submit a complete list of chemicals the Contractor will use and Material Safety Data Sheets (MSDS) for all hazardous materials as defined in OSHA 1910.1200(d), Hazard Determination. Contracting Officer shall have final approval of all materials brought on site.
- F. The Contractor will be held solely responsible for the safety and health of their employees. The contractor will also be held responsible for protecting the health and safety of the VA Community (patients, staff, and visitors) from the unwanted effects of construction. VA staff will monitor the Contractor's performance in complying with all safety and health aspects of the project. Severe or constant violations may result in an immediate work stoppage or request for a Compliance Officer from the Occupational Safety and Health Administration.
- G. During all phases of demolition, construction and alterations, Contractors are required to understand and strictly follow National Fire Protection Association (NFPA) 241, Standard for Safeguarding Construction, Alteration and Demolition Operations. The Medical Center's

Safety and Occupational Health Specialist or Industrial Hygienist will closely monitor the work area for compliance. Appropriate action will be taken for non-compliance.

PART 2 - Specific VA Medical Center Fire and Safety Policies, Procedures and Regulations

2.1 Introduction.

- A. The safety and fire protection of patients, employees, members of the public and government is one of continuous concern to this Medical Center.
- B. Contractors, their supervisors and employees are required to comply with Medical Center policies to ensure the occupational safety and health of all. Failure to comply may result in work stoppage.
- C. While working at this Medical Center, contractors are responsible for the occupational safety and health of their employees. Contractors are required to comply with the applicable OSHA standards found in 29 CFR 1910 for general industry and 29 CFR 1926 for construction. Failure to comply with these standards may result in work stoppage and a request to the Area Director of OSHA for a Compliance Officer to inspect your work site.
- D. Contractors are to comply with the requirements found in the National Fire Protection Association (NFPA) 241, Building Construction and Demolition Operation, and NFPA 51B, Fire Prevention in Use of Cutting and Welding Processes.
- E. Questions regarding occupational safety and health issues can be addressed to the Medical Center Safety and Occupational Health Specialist (ext. 4172) or Industrial Hygienist (ext. 4628).
- F. Smoking is not permitted in any interior areas of the Medical Center, including all interior stairwells, tunnels, construction and/or service/maintenance sites. Compliance with this policy by your direct and subcontracted labor force is required.

2.2 Hazard Communication

- A. Contractors shall comply with OSHA Standard 29 CFR 1926.59, Hazard Communication.
- B. Contractors shall submit to the VA Safety Officer, copies of MSDS covering all hazardous materials to which the Contractor and VA employees are exposed.
- C. Contractors shall inform the Safety Officer of the hazards to which VA personnel and patients may be exposed.
- D. Contractors shall have a written Hazard Communication Program available at the construction site, which details how the Contractor will comply with 29 CFR 1926.59.

2.3 Fires

- A. All fires must be reported. In the event of a fire in your work area, use the nearest pull box station, and also notify Medical Center staff in the immediate area. Emergency notification can also be accomplished by dialing ext. 2222.
- B. Be sure to give the exact location from where you are calling and the nature of the emergency. If a Contractor experiences a fire that was rapidly extinguished by your staff, you still must notify the Construction Safety Officer (ext. 4172) within an hour of the event so that an investigation of the fire can be accomplished.

2.4 Fire Alarms, Smoke Detection and Sprinkler System

If the nature of your work requires the deactivation of the fire alarm, smoke detection or sprinkler system, you must notify the Safety Office. Notification must be made well in advance so that ample time can be allowed to deactivate the system and provide alternative measures for fire protection. Under no circumstance is a Contractor allowed to deactivate any of the fire protection systems in this Medical Center.

2.5 Smoke Detectors

False alarms will not be tolerated. You are required to be familiar with the location of the smoke detectors in your work area. When performing cutting, burning or welding or any other operations that may cause smoke or dust, you must take steps to temporarily cover smoke detectors in order to prevent false alarms. Failure to take the appropriate action

will result in the Contracting Officer assessing actual costs for government response for each false alarm that is preventable. Prior to covering the smoke detectors, the Contractor will notify the Safety Officer, who will also be notified when the covers are removed.

2.6 Hot Work Permit

- A. Hot work is defined as operations including, but not limited to, cutting, welding, thermal welding, brazing, soldering, grinding, thermal spraying, thawing pipes or any similar situation. If such work is required, whenever possible the Contractor must notify the COR no less than one day in advance of such work. The Competent Hot Work Supervisor (CHWS) will inspect the work area and issue a Hot Work Permit, authorizing the performance of such work.
- B. All hot work will be performed in compliance with the Engineering Service Policy 138-047 regarding Hot Work Permits and NFPA 241, Safeguarding Construction, Alteration and Demolition Operations; and NFPA 51B, Fire Prevention in Use of Cutting and Welding Processes; and applicable OSHA standard. A hot work permit will only be issued to individuals familiar with these regulations.
- C. A Hot Work Permit will be issued only for the period necessary to perform such work. In the event the time necessary will exceed one day, a Hot Work Permit may be issued for the period needed; however, the CHWS will inspect the area daily. Hot Work Permit will apply only to the location identified on the permit. If additional areas involve hot work, then additional permits must be requested.

- D. Contractors will not be allowed to perform hot work processes without the appropriate permit.
- E. Any work involving the Medical Center's fire protection system will require advance notification. Under no circumstance will the Contractor or employee attempt to alter or tamper with the existing fire protection system.
- F. Thirty minutes following completion of the hot work, the Fire Watch will perform an inspection of the area to confirm that sparks or drops of hot metal are not present.

2.7 Temporary Enclosures

Only non-combustible materials will be used to construct temporary enclosures or barriers at this Medical Center. Plastic materials and fabrics used to construct dust barriers must conform to NFPA 701, Standard Methods of Fire Tests for Flame-Resistant Textiles and Films.

2.8 Flammable Liquids

All flammable liquids will be kept in approved safety containers. Only the amount necessary for your immediate work will be allowed in the building. Flammable liquids must be removed from the building at the end of each day.

2.9 Compressed Gas Cylinders

Compressed gas shall be secured in an upright position at all times. A suitable cylinder cart will be used to transport compressed gas cylinders. Only those compressed gas cylinders necessary for immediate work will be allowed in occupied buildings. All other compressed gas cylinders will be stored outside of buildings in a designated area. Contractors will comply with applicable standards compressed gas cylinders found in 29 CFR 1910 and 1926 (OSHA).

2.10 Internal Combustion Engine-Powered Equipment

Equipment powered by an internal combustion engine (such as saws, compressors, generators, etc.) will not be used in an occupied building. Special consideration may be given for unoccupied buildings only if the OSHA and NFPA requirements have been met.

2.11 Powder-Activated Tools

The operator of powder-activated tools must be trained and certified to use them. Powder-activated tools will be kept secured at all times. When not in use, the tools will be locked up. When in use, the operator will have the tool under his immediate control.

2.12 Tools

- A. Under no circumstances will equipment, tools and other items of work to be left unattended for any reason. All tools, equipment and items of work must be under the immediate control of your employee.

- B. If for some reason a work area must be left unattended, then tools and other equipment must be placed in an appropriate box or container and locked. All tool boxes, containers or any other device used for the storage of tools and equipment will be provided with a latch and padlock, and will be kept locked at all times, except for putting in and removing tools.
- C. All doors to work areas will be closed and locked when rooms are left unattended. Failure to comply with this policy will be considered a violation of VA Regulations 1.218(b), Failure to comply with signs of a directive and restrictive nature posted for safety purposes, and subject to a \$50.00 fine. Subsequent similar violations may result in both imposition of such a fine as well as the Contracting Officer taking

action under the contract's Accident Prevention Clause [Federal Acquisition Regulation (FAR) 52.236-13] to suspend all contract work until violations may be satisfactorily resolved, or under FAR 52.236-5, Material and Workmanship Clause, to remove from the worksite any personnel deemed by the Contracting Officer to be careless to the point of jeopardizing the welfare of facility patients or staff.
- D. You must report any tools or equipment that are missing to the VA Police Department.
- E. Tools and equipment found unattended will be confiscated and removed from the work area.

2.13 Ladders

Ladders must not be left unattended in an upright position. Ladders must be attended at all times or taken down, and chained securely to a stationary object.

2.14 Scaffolds

All scaffolds will be attended at all times. When not in use, an effective barricade (fence) will be erected around the scaffold to prevent use by unauthorized personnel (Reference OSHA 1926, Subpart L).

2.15 Excavations

The contractor shall comply with OSHA 1926, Subpart P. An OSHA Competent Person must be on site during the excavation. The contractor shall coordinate with the COR and utility companies prior to the excavation to identify underground utilities tanks, etc. All excavations left unattended will be provided with a barricade suitable to prevent entry by unauthorized persons.

2.16 Storage

You must make prior arrangements with the COR for the storage of building materials. Storage will not be allowed to accumulate in the Medical Center buildings.

2.17 Trash and Debris

You must remove all trash and debris from the work area on a daily basis. Trash and debris will not be allowed to accumulate inside or outside of the buildings. You are responsible for making arrangements for removal of trash from the Medical Center facility.

2.18 Protection of Floors

It may be necessary at times to take steps to protect floors from dirt, debris, paint, etc. A tarp or other protective covering may be used. However, you must maintain a certain amount of floor space for the safe passage of pedestrian traffic. Common sense must be used in this matter.

2.19 Signs

Signs must be placed at the entrance to work areas warning people of your work. Signs must be suitable for the condition of the work. Small pieces of paper with printing or writing are not acceptable. The VA Medical Center (VAMC) Safety Officer or COR can be consulted in this matter.

2.20 Accidents and Injuries

Contractors must report all accidents and injuries involving their employees.

2.21 Infection Control

Contractors must control the generation of dust and the contamination of patient care surfaces, supplies and equipment. During demolition phases of the construction:

- A. The construction area shall be under negative pressure, ensuring there is an appreciable flow of clean air from the VA-occupied portion of the facility into the construction area. The airflow shall be sufficiently strong enough to draw in the plastic door flaps commonly located at the construction entrance or at the specific site within the construction area.
- B. Construction debris being transported through the VA-occupied portion of the facility shall be covered and/or wetted.
- C. Construction employees shall remove dust-laden clothing before entering the VA-occupied portion of the facility.
- D. Carpet/sticky mats shall be placed at all construction entrances, and be satisfactorily maintained so as to minimize the tracking of dust into the VA-occupied portion of the facility.
- E. Dry sweeping of dust and debris is not to be performed.

(Control measures B - E above must be practiced during the construction phase.)

2.22 Confined Space Entry

- A. Contractor will be informed that the workplace contains permit-required confined space, and that permit-space entry is allowed only through compliance with a permit space program meeting the requirements of 29 CFR 1910.146 and 1926.21(b)(6).
- B. Contractor will be apprised of the elements including the hazards identified and the Medical Center's (last employer) experience with the space that makes the space in question a permit space.
- C. Contractor will be apprised of any precautions or procedures that the Medical Center has implemented for the protection of employees in or near permit space where Contractor personnel will be working.
- D. Medical Center and Contractor will coordinate entry operations when both Medical Center personnel and Contractor personnel will be working in or near permit spaces as required by 29 CFR 1910.146(d)(ii) and 1926.21(b)(6).
- E. Contractor will obtain any available information regarding permit space hazards and entry operation from the Medical Center.
- F. At the conclusion of the entry operations, the Medical Center and Contractor will discuss any hazards confronted or created in permit spaces.
- G. The Contractor is responsible for complying with 29 CFR 1910.246(d) through (g) and 1926.21(b)(6). The Medical Center, does not provide rescue and emergency services required by 29 CFR 1910.246(k) and 1926.21(b)(6).

2.23 Contractor Parking and Material Delivery

There is no Contractor parking on Medical Center property unless the contract drawings show a designated staging area that is under the Contractor's control.
Contractor's delivery of building materials tools, etc., must be pre-arranged with the Project Manager.

Pre Construction Risk Assessment (PCRA)

Project: _____ Project/Contract #: _____

This form may be used for projects or activities to determine if a Site Specific Safety Plan (SSSP) is necessary. If the contractor or vendor is not working independently (VAMC Supervisor is present and in control of the contractor) and the job is short duration (less than five working days) and the hazard analysis does not include any high risk activities, then Occupational Health and Safety may allow work without submitting a SSSP.

| Activity | Yes | High Risk |
|--|-----|-----------------------|
| 1. Respiratory protection is required for the work being conducted List specifics: (activity being preformed, PPE Being used, Training, Fit testing). | | |
| 2. Hearing protection is required for the work being conducted List specifics: (Type of noise; impact, constant, start up). | | |
| 3. Other personal protective equipment is required for the work being conducted, what activity? _____ List specifics: (Gloves, safety Glasses, hard hat, steel toes, overalls). | | |
| 4. Are there overhead hazards associated with the activity being conducted? Wires, power, communication, grounding, location(s), signage. List specifics: | | Yes |
| 5. Work is being conducted in a confined space. Permit required? Training? List specifics: Tanks, sewer, tunnels, Rescue Team notification. | | PRCS Only |
| 6. Ladders will be necessary for the work being conducted. | | |
| 7. Scaffolding will be necessary for the work being conducted. List specifics: | | Greater than six feet |
| 8. Other work platforms will be necessary for the work being conducted. List specifics: Rails, toe boards, netting | | Greater than six feet |
| 9. Fall protection is required for the work being conducted. List specifics: | | Yes |

| | | |
|--|-----|--|
| 10. ASBESTOS Abatement Exposure to asbestos may be associated with the work being conducted. List specifics: Renovation, Demolition, Emergency Response <u>29 CFR 1910.1001.</u> | | Yes unless approved by the Asbestos Manager |
| Activity | Yes | High Risk |
| 11. Hazardous materials will be used. MSDSs will be provided for known substances List specifics: 29 CFR 1910.1200. | | |
| 12. Hot work (Cutting, Welding, Brazing, etc). Use of VAMC Cleveland Hot Work Policy (ECP 138-047) is required. | | |
| 13. Additional ventilation will be necessary for the work being conducted. List specifics: Reason for need of ventilation, confined space, foul odor, excessive heat. | | |
| 14. Operation and maintenance of electric power generation, control, transformation, transmission, and distribution lines and equipment are necessary for the work being conducted. List specifics: | | Yes |
| 15. Work will be conducted on energized equipment. Use of VAMC Cleveland Working on Energized Equipment policy (138- 034) is required. List specifics: list voltages in area, emergency procedures. | | Yes |
| 16. Other electrical work will be conducted. List specifics: | | |
| 17. Lock Out/Tag Out will be necessary for the work being conducted. List specifics: | | |
| 18. Cranes, derricks, or slings will be necessary for the work being conducted. List specifics: | | Yes |
| 19. Excavating will be necessary for work being conducted. List site specifics: | | Yes |

| Activity | Yes | High Risk |
|--|-----|-----------|
| 20. Excavating or earthmoving equipment will be used. List specifics: | | |
| 21. Industrial trucks will be used. List specifics: | | |
| 22. Other motorized vehicles will be used. List specifics: | | |
| 23. Concrete and masonry construction operations will be necessary for work being conducted. List specifics: % of recycled components | | |
| 24. Steel erection activities will be necessary for the work being conducted. List specifics: New Steel % of recycled material, | | Yes |
| 25. Alteration, conversion, or improvement of existing electric transmission and distribution lines and equipment will be necessary for the work being conducted. List specifics: | | Yes |
| 26. Hand and portable powered tools or other hand-held equipment will be used. | | |
| 27. Compressed gas or compressed air equipment is necessary for work being conducted. | | |
| 28. List all other hazardous activities that will be conducted or potentially hazardous equipment that will be used including vibration hazards. | | |

| Activity | Yes | High Risk |
|---|-----|---------------------------|
| 29. Infection Control Risks identified. Infection Control Risk Assessment (ICRA) required- refer to Enclosure (1). | | Yes unless approved by IC |
| 30. Life Safety Risks identified. Interim Life Safety Risk Assessment Form -Attachment (4) - must be completed and submitted. | | |
| 31. Emergency Procedures Identified. Fire, severe weather, utility failure, etc. | | |
| 32. Demolition will be necessary for the work being conducted. | | Yes |
| 33. <i>New Construction:</i> Minimum ___%___ of total project waste shall be diverted from landfill. Recycled aggregate, Concrete, Steel. | | |
| 34. <i>Interior Remodeling:</i> Minimum ___%___ of total project waste shall be diverted from landfill. a) Ceiling tile b) Steel c) Carpet | | |

Submitted by (Contractor)_____ Date: _____

Reviewed by (COR) _____ Date: _____

Reviewed by (CSM) _____ Date: _____

SSSP Required Yes No

**Construction Safety Poster – Cleveland VA
Project:**

Project #:

VAMC Emergency Number – 2222

Infection Control Category:

Fire Extinguisher Locations:

Fire Alarm Location:

Safe Area of Refuge Location:

Evacuation Assembly Location:

MSDS Location:

COR: _____

Phone: _____

Interim Life Safety Risk Assessment Form

Project: _____ **Date:** _____

Location: _____

Estimated completion Date _____ **Actual Completion Date** _____

Life Safety Risk Assessment

| Guidelines: | Yes/ No | Comments | ILSM |
|--|------------|----------|------|
| 1. Will exit egress routes from occupied areas remain unchanged? | | | |
| 2. Will exit stairs remain unobstructed and fire separated? | | | |
| 3. Will fire and smoke compartments remain intact and unchanged? | | | |
| 4. Will fire alarm detection systems remain functional and unimpaired? | | | |
| 5. Will fire suppression systems remain function and unimpaired? | | | |
| 6. Will construction area be separated by noncombustible smoke tight partitions? | | | |
| 7. Will emergency access by fire department remain unobstructed? | | | |
| 8. Will normal distances to exits be maintained? | | | |
| 9. Will all hazardous areas be protected? | | | |

Interim Life Safety Measures (ISLM)

- | | |
|---|---|
| A. Ensure Egress | H. Conduct 2 Fire Drills Per Shift in All Areas |
| B. Emergency Forces Access | I. Conduct 2 Fire Drills Per Shift in Local Area |
| C. Fire Department Notification | J. Increase Hazard Surveillance |
| D. Ensuring Operational Life Safety Systems | K. Compartmentation Training of Personnel |
| E. Temporary Construction | L. Conduct Organizational Training on Life Safety |
| F. Additional Fire Fighting Equipment | M. Conduct Additional Training on Incident Response |
| G. Control Combustible Loading | N. Institute a Fire Watch |

BID ISSUE
04/24/2015

VAMC WADE PARK
PROVIDE SMOKE SHELTER
PROJECT #:541-17-212

Life Safety Narrative:

Assessment Performed By:_____

Contracting Officer Technical Representative

Assessment Reviewed By:_____

VAMC Cleveland Occupational Health and Safety

Contractor Safety and Security Orientation

In order to promote safety in construction activities at VAMC Cleveland, all contract employees will receive orientation to communicate facility-specific safety concerns. This document provides examples of discussion points used to give contractors the necessary site-specific safety and procedural information. Refer to the Infection Control During Construction program for Infection Control Orientation discussion points.

Check all that apply:

| | |
|--|--|
| | Specific Items on the Hazardous Work Activity Checklist (Attachment 2) |
| | Stop Work Authority |
| | Confined Space Entry Requirements |
| | Obtaining and Updating Hot Work Permits |
| | Interim Life Safety Measures (Attachment 4) |
| | .Job Site Security |
| | Contractor ID Badge Requirements |
| | Contractor Key Requirements |
| | Contractor Parking Requirements |
| | Process for Working Before or After Normal Hours |
| | VA Daily Log |
| | Request for Information |
| | Other Not Previously Mentioned |

Job Safety Check Sheet

Project ID: _____ COR: _____ Date: _____

Location: _____

A. Personal Protective Equipment:

| | No. | Grade | N/A | COMMENTS –Note Improvements Needed: |
|--|-----|-----------|-----|-------------------------------------|
| 1. Hard hats in use by all personnel. | A1 | 1 2 3 4 5 | N/A | |
| 2. Eye protection in use by all personnel. | A2 | 1 2 3 4 5 | N/A | |
| 3. Hearing protection (engineering controls, double protection for high noise areas, rotation of employees). | A3 | 1 2 3 4 5 | N/A | |
| 4. Proper footwear and protective clothing. | A4 | 1 2 3 4 5 | N/A | |
| 5. Fall protection in use. | A5 | 1 2 3 4 5 | N/A | |
| 6. Respirators/face masks in good condition and used as required (medical evaluation and fit test). | A6 | 1 2 3 4 5 | N/A | |

B. Tools and Equipment:

| | No. | Grade | N/A | COMMENTS –Note Improvements Needed: |
|---|-----|-----------|-----|-------------------------------------|
| 1. Tools and equipment in good condition. | B1 | 1 2 3 4 5 | N/A | |
| 2. All equipment properly guarded. | B2 | 1 2 3 4 5 | N/A | |
| 3. Electrical equipment connected properly, grounded and in good condition; GFCI; automatic magnetic cut-off for woodworking tools. | B3 | 1 2 3 4 5 | N/A | |
| 4. Air/sandblast hoses in good condition and properly wired. | B4 | 1 2 3 4 5 | N/A | |
| 5. Compressors equipped with automatic shut-off. | B5 | 1 2 3 4 5 | N/A | |
| 6. Ladders in good condition; tied back; extended 3 ft. beyond landing. | B6 | 1 2 3 4 5 | N/A | |

C. Scaffolding: ☐ Suspended ☐ Tubular ☐ Other (*Rope Falls Not Permitted*)

| | No. | Grade | N/A | COMMENTS –Note Improvements Needed: |
|--|-----|-----------|-----|-------------------------------------|
| 1. Scaffold in good repair; guardrails; toe boards and wire mesh in place. | C1 | 1 2 3 4 5 | N/A | |
| 2. Counterweights marked with weight and in proper ratio. | C2 | 1 2 3 4 5 | N/A | |
| 3. Scaffold tied back and tied in. | C3 | 1 2 3 4 5 | N/A | |
| 4. Passageways under scaffold blocked. | C4 | 1 2 3 4 5 | N/A | |

D. Hazardous Chemicals/Air Contaminants:

| | No. | Grade | N/A | COMMENTS –Note Improvements Needed: |
|--|-----|-----------|-----|-------------------------------------|
| 1. Hazard Communication Right-To-Know poster / written program on job. | D1 | Y N | N/A | |
| 2. List of hazardous materials on job. | D2 | Y N | N/A | |
| 3. Material Safety Data Sheets available. | D3 | Y N | N/A | |
| 4. Employees are familiar with program. | D4 | 1 2 3 4 5 | N/A | |
| 5. Proper containers in use with correct labels. | D5 | 1 2 3 4 5 | N/A | |

E. General:

| No. | Y | N | N/A | COMMENTS –Note Improvements Needed: |
|------------|----------|----------|------------|--|
| E1 | Y | N | N/A | |
| E2 | Y | N | N/A | |
| E2 | Y | N | N/A | |
| E2 | Y | N | N/A | |
| E3 | Y | N | N/A | |
| E4 | Y | N | N/A | |
| E5 | Y | N | N/A | |
| E6 | Y | N | N/A | |
| E8 | Y | N | N/A | |
| E9 | Y | N | N/A | |

F. Fire Safety (ILSM)

| No. | Y | N | N/A | COMMENTS –Note Improvements Needed: |
|------------|----------|----------|------------|--|
| F1 | Y | N | N/A | |
| F2 | Y | N | N/A | |
| F3 | Y | N | N/A | |
| F4 | Y | N | N/A | |
| F5 | Y | N | N/A | |
| F3 | Y | N | N/A | |
| F4 | Y | N | N/A | |
| F5 | Y | N | N/A | |

G. Paperwork and Other Postings:

| No. | Y | N | N/A | COMMENTS –Note Improvements Needed: |
|------------|----------|----------|------------|--|
| G1 | Y | N | N/A | |
| G2 | Y | N | N/A | |
| G3 | Y | N | N/A | |
| G4 | Y | N | N/A | |
| G5 | Y | N | N/A | |

Additional Comments:

Infection Control During Construction

1. Objective. To prevent the acquisition of healthcare-associated infections in patients, healthcare workers, visitors and contractors during healthcare system construction, renovation, repair or demolition activities.

2. Policy

a. All construction, renovation, demolition and repair projects will be reviewed with Infection Control during the design/planning phase.

b. Infection Control will participate in meetings and area walk-through inspections on a routine basis.

c. All contractors, including subcontractors, must follow the infection control procedures as described in this guideline.

3. Planning Phase

a. Infections Control will participate in design/planning, as well as project kick-off meetings. The Assistant Chief, Engineering Service, Planning and Construction will notify Infection Control of all new projects.

b. Construction design and functional considerations for environmental infection control:

- (1) Location of sinks and dispensers for hand washing products and hand hygiene products.
- (2) Location of fixed sharps containers.
- (3) Types of faucets (e.g., aerated vs. non-aerated; hand control vs. foot control).
- (4) Air handling systems engineered for optimal performance, easy maintenance and repair.
- (5) Types of surface finishes (e.g., porous vs. non-porous).
- (6) Well-caulked walls with minimal seams.
- (7) Location of adequate storage and supply areas.
- (8) Appropriate location of medicine preparation areas (e.g., > 3 ft from sink).
- (9) Appropriate location and type of ice machines.
- (10) Appropriate materials for sinks and wall coverings.
- (11) Appropriate traffic flow.
- (12) Isolation rooms with anterooms as appropriate.
- (13) Appropriate flooring (e.g., seamless floors in dialysis units, operating rooms).
- (14) Sensible use of carpeting.
- (15) Convenient location of soiled utility areas.

General Requirements

- (16) Properly engineered areas for linen services and solid waste management.
- (17) Location of main emergency generator to minimize the risk of system failure from flooding or other emergency.

c. An Infection Control Risk Assessment (ICRA) will be performed using Attachment 1. A multi-disciplinary ICRA team shall be established prior to each project. The goals of the team are to identify high-risk patient populations and locations, and to minimize the risk for airborne infection during projects and after their completion. Suggested members include: Infection Control personnel; Laboratory personnel; Executive Management or designees; Assistant Chief Engineering, Planning and Construction (or designee); Patient Safety Officer; Chiefs or designees of specialized programs (e.g., ICU, Oncology, OR); Safety Manager; Chief, Environmental Care Section; Construction administrators or designees; Architects; Design COR; Project Managers; and COR.

d. Appropriate Infection Control guidelines including PPD requirements will be reviewed with VAMC personnel, COR and Project Managers during this phase for incorporation into design and construction bid packages.

e. Mandatory adherence requirements for infection control should be incorporated into construction contracts, with mechanisms to ensure timely correction of deficiencies.

4. Pre-Construction Phase

a. Infection Control will attend the Pre-Construction meeting or the Safety and Infection Control Pre-construction meeting if held separately.

b. Infection Control will provide education to contractors and subcontractors during orientation, and on an ongoing basis as necessary. Contractor Employee Orientation Training will be completed before the start of work. Attachment 2 can be used as a guide for conducting this training.

5. Construction Phase

a. Infection Control Permits (Attachment 3) will be issued by the Infection Control Manager. The Infection Control permits will be posted outside the appropriate construction area. More than one permit may be issued for a construction project if necessary.

b. Infection Control, in conjunction with VA Facilities, COR and the Contractor will conduct routine inspections of all sites. Compliance issues will be documented and addressed immediately. Attachment 4 may be used as a guide when performing these inspections.

c. Infection Control shall monitor for airborne disease (e.g., aspergillosis) as appropriate during projects. It is recommended that a baseline of conditions be established prior to the

beginning of the project, and periodically reviewed during the project to determine impact of construction activities on indoor air quality by Infection Control, in conjunction with Safety. If cases of aspergillosis or other healthcare-associated airborne fungal infections occur, diagnosis confirmation will be pursued with tissue biopsies and cultures as feasible. In addition, the following shall occur:

- (1) Review pressure-differential monitoring documentation to verify that pressure differentials in the construction zone and in the patient care rooms are appropriate for their settings. The requirement for negative air pressure in the construction zone shall depend on the location and type of activity.
- (2) Implement corrective engineering measures to restore proper pressure differentials as needed.
- (3) Conduct a prospective search for additional cases.
- (4) If no epidemiologic evidence of ongoing transmission exists, continue routine maintenance of the area. Conduct an environmental assessment to find and eliminate the source:
 - (a) Collect environmental samples from potential sources of airborne fungal spores, preferably by using a high-volume air sampler rather than settle plates.
 - (b) If either an environmental source of airborne fungi or an engineering problem with filtration or pressure differentials is identified, perform corrective measures to eliminate the source and route of entry.
 - (c) Use an antifungal biocide registered by the Environmental Protection Agency (EPA) for decontaminating structural materials.
 - (d) If an environmental source of airborne fungi is not identified, review infection control measures, including engineering controls, to identify potential areas for correction or improvement.

d. Medical Waste

- (1) Hospital staff shall remove any medical waste, including sharps containers, from areas to be renovated or constructed prior to the start of the project.
- (2) Infection Control shall be notified immediately if unexpected medical waste is encountered.

e. Temporary Construction Barriers: Construction, demolition, or renovation sites must be separated from patient-care areas and critical areas, such as Supply, Processing and Distribution and Pharmacy, by barriers that keep the dirt and dust inside the worksite.

- (1) The integrity of the temporary construction barriers must assure a complete seal of the construction area from adjacent areas.

- (2) If walls are used as temporary construction barriers, they shall be constructed of gypsum board or treated plywood [flame spread rating of 25 or less in accordance with American Society for Testing and Materials (ASTM) E84] on both sides of wood or metal steel studs. Walls shall be extended through suspended ceilings to floor slab/deck or roof. All joints and penetrations must be sealed. Other barriers may be used upon approval by the COR, Infection Control and Safety.

f. Environmental Control

(1) External demolition and construction activities

- (a) Determine if the facility can operate temporarily on re-circulated air; if feasible, seal off adjacent air intakes.
- (b) If this is not possible or practical, check the low-efficiency filter banks frequently and replace as needed to avoid buildup of particulates.
- (c) Seal windows and reduce wherever possible other sources of outside air intrusion (e.g., open doors in stairwells and corridors).
- (d) Avoid damaging the underground water system to prevent soil and dust contamination of the water.

(2) Internal construction, repairs and renovations

- (a) Relocate patients whose rooms are adjacent to work zones, depending on their immune status, the scope of the project, the potential for generation of dust or water aerosols, and the methods used to control these aerosols.
- (b) Ensure proper operation of the air-handling system in the affected area after erection of barriers and before the room or area is set to negative pressure. Return air vents should be sealed off and blocked if rigid barriers are used for containment.
- (c) Create and maintain negative air pressure in work zones adjacent to patient-care areas and ensure that required engineering controls are maintained.
- (d) A HEPA (High Efficiency Particulate Accumulator) filter vacuum system rated at 95% capture of 0.3 microns shall be utilized. Ensure that negative air pressures occur within the work area. HEPA filtration is required where the exhaust dust may re-enter the breathing zone. HEPA filters should have American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 85 or other prefilter to extend the useful life of the HEPA. Exhaust hoses shall be heavy duty, flexible steel reinforced and exhausted so that dust is not reintroduced into the facility.
- (e) Negative airflow shall be monitored inside the rigid barriers.
- (f) Barriers shall be monitored to ensure their integrity; any gaps or breaks in barrier joints shall be repaired immediately.

- (g) Windows in work zones shall be sealed if practical; use window chutes for disposal of large pieces of debris as needed, but ensure that the negative pressure differential for the area is maintained.
- (h) In patient care areas, for major repairs that include removal of ceiling tiles and disruption of the space above the false ceiling, use plastic sheets or prefabricated plastic units to contain dust; use negative air pressure systems within this enclosure to remove dust; and either pass air through an industrial-grade portable HEPA filter capable of filtration rates of 300-800 ft³/min., or exhaust air directly to the outside away from any air intake devices.

g. Traffic Control

- (1) Designated entry and exit procedures will be defined (in conjunction with any necessary Interim Life Safety Measures) for each construction project where applicable.
- (2) All egress pathways will be free of debris.
- (3) Unauthorized personnel will not be allowed to enter the construction zone.
- (4) Only designated elevators will be used for construction activities during scheduled times.

h. Cleaning

- (1) The construction zone and adjacent entry areas shall be maintained by the contractor in a clean and sanitary manner, and will be swept and wet mopped daily or more frequently as needed to minimize dust generation. Vacuum utilizing HEPA filtration. Area shall be maintained frequently and debris shall be removed as they are created.
- (2) Debris shall not be hauled through patient care areas without prior approval of the COR, Infection Control and Safety. When approved, debris shall be hauled in enclosed dust-proof containers or wrapped in plastic and sealed with duct tape. No sharp objects shall be allowed to cut through the plastic. Wipe down the exterior of the containers with a damp rag to remove dust.
- (3) Adhesive walk-off/carpet walk-off mats, minimum 24" x 36" shall be used at all interior transitions from the construction area to occupied Healthcare System areas. These mats shall be changed as often as required to maintain clean work areas directly outside the construction area. Other methods may be utilized as approved by Infection Control and the COR.
- (4) There shall be no standing water during construction. This includes water in equipment drip pans and open containers within the construction areas. All accidental spills must be cleaned up and dried within 12 hours. Remove and dispose of porous materials that remain damp for more than 48 hours.
- (5) Environmental Care Service will be responsible for the routine cleaning of adjacent areas and for the terminal cleaning of the construction zone prior to the opening of

General Requirements

the newly renovated or constructed area. Specific responsibility will be defined in the construction contract.

i. Contract Personnel Requirements

- (1) Clothing shall be free of loose soil and debris upon exiting the construction zone.
- (2) Personal protective equipment, including face shields, gloves, and N95 respirators will be utilized as appropriate for the task at hand. Contractors are responsible for providing personal protective equipment.
- (3) Contractors entering sterile/invasive procedure areas will be provided with a disposable jump suit, head covering and shoe coverings that must be removed prior to exiting the work area. Tools and equipment must be damp-wiped prior to entry and exit from sterile and invasive procedure areas.
- (4) All equipment, tools, material, etc., transported through occupied areas shall be made free from dust and moisture by vacuuming and wipe down. Tools and equipment soiled with blood and body fluids will be cleaned with an approved germicide.

j. Environmental Monitoring

- (1) Infection Control, in conjunction with Facilities Management and Safety, will plan for environmental monitoring as appropriate for the project.
- (2) There is no current Centers for Disease Control (CDC) recommendation regarding routine microbiologic air sampling before, during or after construction, or before or during occupancy of areas housing immuno-compromised patients. Infection Control will provide for baseline and periodic sampling as needed.
- (3) Traffic control.
- (4) Personal protective equipment.
- (5) Water supply.

5. Completion Phase

- a. After completion of construction, ventilation will meet specifications as mandated by regulatory bodies. Restore HVAC, humidity and pressure differentials; replace spent filters with new filters.
- b. The area will be thoroughly cleaned and disinfected before being placed into service.
- c. Potable water supply lines will be flushed before placing newly renovated or constructed areas into service. The construction contractor shall certify that the potable water is safe for use.
- d. The ICRA team will submit a final report to the Assistant Chief, Engineering Service, Planning and Construction regarding the compliance/noncompliance of Infection Control precautions during the project.

BID ISSUE
04/24/2015

VAMC WADE PARK
PROVIDE SMOKE SHELTER
PROJECT #:541-17-212

Attachments

1. Infection Control Risk Assessment
2. Infection Control Contractor Orientation
3. Infection Control Permit
4. Infection Control Inspection Checklist

Infection Control Risk Assessment

Matrix of Precautions for Construction & Renovation

Step One: Using the following table, identify the *Type (A-D) of Construction Project Activity*.

| | |
|---------------|---|
| TYPE A | Inspection and Non-Invasive Activities. Includes, but is not limited to: <ul style="list-style-type: none">• Removal of ceiling tiles for visual inspection limited to 1 tile per 50 square feet.• Painting (but not sanding).• Wall covering, electrical trim work, minor plumbing and activities that do not generate dust or require cutting of walls or access to ceilings other than for visual inspection. |
| TYPE B | Small scale, short duration activities that create minimal dust. Includes, but is not limited to: <ul style="list-style-type: none">• Installation of telephone and computer cabling.• Access to chase spaces.• Cutting of walls or ceiling where dust migration can be controlled. |
| TYPE C | Work that generates a moderate to high level of dust or requires demolition or removal of any fixed building components or assemblies. Includes, but is not limited to: <ul style="list-style-type: none">• Sanding of walls for painting or wall covering.• Removal of floor coverings, ceiling tiles and casework.• New wall construction.• Minor duct work or electrical work above ceilings.• Major cabling activities.• Any activity that cannot be completed within a single work shift. |
| TYPE D | Major demolition and construction projects. Includes, but is not limited to: <ul style="list-style-type: none">• Activities that require consecutive work shifts.• Requires heavy demolition or removal of a complete cabling system.• New construction. |

STEP 1: _____

Step Two: Using the following table, identify the *Patient Risk Groups* that will be affected.

| Low Risk | Medium Risk | High Risk | Highest Risk |
|--|---|---|--|
| <ul style="list-style-type: none">Office areas | <ul style="list-style-type: none">CardiologyEchocardiographyEndoscopyNuclear MedicinePhysical TherapyRadiology/MRIRespiratory Therapy | <ul style="list-style-type: none">CCUEmergency RoomLabor & DeliveryLaboratories (specimen)Newborn NurseryOutpatient SurgeryPediatricsPharmacyPost Anesthesia Care UnitSurgical Units | <ul style="list-style-type: none">Any area caring for immuno-compromised patientsBurn UnitCardiac Cath LabCentral Sterile SupplyIntensive Care UnitsMedical UnitNegative pressure isolation roomsOncologyOperating rooms including C-section rooms |

Step 2: _____

Step Three: Match the...

Patient Risk Group (*Low, Medium, High, Highest*) with the planned ...
Construction Project Type (*A, B, C, D*) on the following matrix, to find the ...
Class of Precautions (*I, II, III or IV*) or level of infection control activities required.
(Class I-IV or Color-Coded Precautions are delineated on the following page.)

IC Matrix - Class of Precautions: Construction Project by Patient Risk

| Construction Project Type | | | | |
|---------------------------|--------|--------|--------|--------|
| Patient Risk Group | TYPE A | TYPE B | TYPE C | TYPE D |
| LOW Risk Group | I | II | II | III |
| MEDIUM Risk Group | I | II | III | III/IV |
| HIGH Risk Group | I | II | III/IV | III/IV |
| HIGHEST Risk Group | II | III/IV | III/IV | III/IV |

Note: Infection Control approval will be required when the Construction Activity and Risk Level indicate that **Class III** or **Class IV** control procedures are necessary.

Step 3: _____

Description of Required Infection Control Precautions by Class

| During Construction Project | | Upon Completion of Project |
|-----------------------------|---|---|
| CLASS I | <ol style="list-style-type: none"> 1. Notify and receive permission from the COR to perform requested work. 2. Execute work by methods to minimize raising dust from construction operations. 3. Immediately replace a ceiling tile displaced for visual inspection. | <ol style="list-style-type: none"> 1. Notify COR for inspection once the work is complete. |
| CLASS II | <ol style="list-style-type: none"> 1. Notify and receive permission from the COR to perform requested work. 2. Provide active means to prevent airborne dust from dispersing into atmosphere. 3. Water mist work surfaces to control dust while cutting. 4. Seal unused doors with duct tape. 5. Block off and seal air vents. 6. Place dust mat at entrance and exit of work area. 7. Remove or isolate HVAC system in areas where work is being performed. | <ol style="list-style-type: none"> 1. Wipe work surfaces with disinfectant. 2. Contain construction waste before transport in tightly covered containers. 3. Wet mop and/or vacuum with HEPA filtered vacuum before leaving work area. 4. Remove isolation of HVAC system in areas where work is being performed. |

| | | |
|-------------------------|--|---|
| <p>CLASS III</p> | <ol style="list-style-type: none"> 1. Obtain and post valid Infection Control Construction Permit at each work site. Permit must be signed by COR, I.C. Nurse and General Contractor to be valid. 2. Remove or isolate HVAC system in area where work is being done to prevent contamination of duct system. 3. Complete all critical barriers, i.e., sheetrock, plywood, plastic, to seal area from non-work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins. Construction of barrier will need to occur outside normal work shifts with approval of COR. 4. Construct anteroom where possible and directed by COR. 5. Maintain negative air pressure within work site utilizing HEPA equipped air filtration units. 6. Contain construction waste before transport in tightly covered containers. 7. Cover transport receptacles or carts. Tape covering unless solid lid. 8. If the spread of dust from construction personnel is not contained workers may be required to wear shoe covers and or be vacuumed prior to leaving worksite at the discretion of the COR or I.C. Nurse. 9. Seal holes, pipes, conduits and punctures appropriately. | <ol style="list-style-type: none"> 1. Do not remove barriers from work area until completed project is inspected by the VA's Safety Department. 2. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction. Barriers are required to be removed after hours with approval of COR. 3. Vacuum work area with HEPA filtered vacuums. 4. Wet mop area with disinfectant. 5. Remove isolation of HVAC system in areas where work is being performed. |
| <p>CLASS IV</p> | <ol style="list-style-type: none"> 1. Follow all requirements listed in Class III as well as additional requirements listed below. 2. Construct anteroom and require all personnel to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving work site, or they can wear cloth or paper coveralls that are removed each time they leave the work site. 3. All personnel entering work site are required to wear shoe covers. Shoe covers must be changed each time the worker exits the work area. | <ol style="list-style-type: none"> 1. Before work is turned over and accepted by the VA a certified I.H. must be used to certify cleaning as well as swab and air sampling of the area. These tests shall meet or exceed industry standards for the type of area being renovated. |

Step 4: Identify the areas surrounding the project area, assessing potential impact.

| | | | | | |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| <i>Unit Below</i> | <i>Unit Above</i> | <i>Lateral</i> | <i>Lateral</i> | <i>Behind</i> | <i>Front</i> |
| | | | | | |
| <i>Risk Group</i> | <i>Risk Group</i> | <i>Risk Group</i> | <i>Risk Group</i> | <i>Risk Group</i> | <i>Risk Group</i> |

Step 5: Identify specific site of activity, e.g., patient rooms, medication room, etc.

Step 6: Identify issues related to: ventilation, plumbing, electrical, in terms of the occurrence of probable outages.

Step 7: Identify containment measures, using prior assessment. What types of barriers (e.g., solids wall barriers)? Will HEPA filtration be required?

(Note: Renovation/construction area shall be isolated from the occupied areas during construction and shall be negative with respect to surrounding areas.)

Step 8: Consider potential risk of water damage. Is there a risk due to compromising structural integrity (e.g., wall, ceiling, roof)?

Step 9: Work hours - can or will the work be done during non-patient care hours?

Step 10: Do plans allow for adequate number of isolation/negative airflow rooms?

Step 11: Do the plans allow for the required number and type of hand washing sinks?

Step 12: Does the infection control staff agree with the minimum number of sinks for this project? *(Verify against AIA Guidelines for types and area.)*

Step 13: Does the infection control staff agree with the plans relative to clean and soiled utility rooms?

Step 14: Plan to discuss the following containment issues with the project team: traffic flow, housekeeping, debris removal (how and when).

***Appendix:** Identify and communicate the responsibility for project monitoring that includes infection control concerns and risks. The ICRA may be modified throughout the project. Revisions must be communicated to the Project Manager.*

Infection Control Orientation for Construction Workers

The goal of the Infection Control Program is to identify and reduce the risks of acquiring and transmitting infections among patients, employees, physicians and other licensed independent practitioners, contract service workers, volunteers, students and visitors.

During construction, renovation and minor improvement projects, hidden infectious disease hazards may be released into the air, carried on dust particles or on clothing. One such hazard is fungal organisms such as *Aspergillus*. *Aspergillus* species may be found in decaying leaves and compost, plaster and drywall, and settled dust. These organisms usually do not cause problems in healthy people, but can cause problems in a hospital full of sick patients! *Aspergillus* and other fungal organisms can cause illness and even death in people with certain medical conditions such as transplant patients, cancer treatment patients and patients with lung problems or poor immunity. Therefore, it is critical that you do your part to keep our patients, employees and visitors as safe and healthy as possible. We, in turn, will make conditions as safe as possible for you.

1. Medical Waste

- a. We will remove any medical waste, including sharps containers (for used needles and syringes), from construction areas prior to the start of projects.
- b. If you (contract workers) find any needles, syringes or sharp medical objects, please notify your supervisor and the Infection Control Nurse (X) *immediately*.

2. Barrier Walls

The construction areas *must* be kept separate from patient care areas by barriers that keep the dust and dirt inside the worksite. The walls must provide a complete seal of the construction area from adjacent areas (walls may be rigid or 4 - 6 mil thickness plastic).

3. Environmental Control

- a. Negative air pressure must be maintained within the construction area.
- b. Demolition debris must be removed in tightly fitted covered carts. Use specified traffic patterns.
- c. Sticky or walk-off mats are placed immediately outside the construction zone and changed whenever necessary to control the spread of dust and dirt.
- d. Exterior window seals are to be used to reduce the amount of outside excavation debris coming into the building.
- e. If demolition chutes are used, they must be sealed when not in use. The chute and damper should be sprayed with water, as necessary, to maintain dust control.

- f. Control, collection and disposal must be provided for any drain liquid or sludge found when demolishing plumbing.

4. Traffic Control

- a. Use designated entry and exit procedures.
- b. Keep all egress pathways free of debris.
- c. No unauthorized personnel should be allowed to enter construction areas.
- d. Use designated elevators only.

5. Cleaning

- a. Keep the construction area clean on a *daily* basis.
- b. Dust and dirt *must* be kept to a minimum.

6. Workers

- a. Clothing must be free of loose soil and debris when exiting the construction area.
- b. Use personal protective equipment (masks, face shields, etc.) as indicated for the task at hand.
- c. Handwashing is the best method of reducing the transmission of infection. Always wash your hands with soap and water after visiting the restroom, before eating or smoking, and when leaving the construction site.

Questions? Please feel free to call the Infection Control Nurse, Ext. xxxx

Infection Control Construction Permit

| | |
|------------------------------------|--|
| Construction Class: | |
| Project Name and Number: | Permit #: |
| Location of Construction: | |
| COR: | Telephone: |
| Contractor Performing Work: | |
| Supervisor: | Telephone: |
| CLASS I | <ol style="list-style-type: none"> 1. Obtain approval from COR before activities begin 2. Work performed is limited to inspections and minor installations 3. Execute work by methods to minimize raising dust from inspection operations 4. Permit does not need to be posted for this classification. |
| CLASS II | <ol style="list-style-type: none"> 1. Obtain and post infection control permit at work location before work begins 2. Provide active means to prevent air borne dust from dispersing into atmosphere 3. Place dust mat at entrances and exits of work sites 4. Tools and equipment must be cleaned prior to entrance to the medical center 5. Isolate HVAC and seal unused doors with duct tape 6. Contain construction waste before transport in tightly covered containers |
| CLASS III | <ol style="list-style-type: none"> 1. Obtain and post infection control permit at work location before work begins 2. Follow all requirements listed for Class II in addition to requirements listed below 3. Isolate supply and return ductwork to prevent contamination of system. 4. Complete all critical dust barriers as well as the creation of an anti-room where required for inspection by COR before work begins. 5. Maintain negative air pressure within work site utilizing HEPA equipped air filtration units. 6. Construct antiroom where required by COR and I.C. Nurse 7. Obtain COR approval before construction and removal of any dust partitions 8. Include paticle count readings on daily logs against baseline points as required by COR or I.C. Nurse. |

BID ISSUE
04/24/2015

VAMC WADE PARK
PROVIDE SMOKE SHELTER
PROJECT #:541-17-212

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|--|---|
| CLASS IV | 1. Obtain and post infection control permit at work location before work begins 2. Follow all requirements listed for Class III in addition to requirements listed below 3. Workers are required to wear clean suites on site 4. All personnel entering and leaving work site must be vacuumed using a HEPA filter vacuum cleaner. 5. This class of permit will require additional specialized precautions unique to each activity which will be listed below |
| | <p>€ PPDs Required</p> <p>€ Additional Requirements:</p> |
| Infection Control Nurse: Date: | |
| COR: Date: | |
| Contractor: Date: | |

BID ISSUE
04/24/2015

VAMC WADE PARK
PROVIDE SMOKE SHELTER
PROJECT #:541-17-212

Infection Control Construction Inspection Form

| | | | | | |
|--|-----|--------|------|---------|-----------------------|
| Construction Location/Project #: | | | | | PI Infection Control: |
| Contractor: | | | | Phone: | COR: |
| Type of Construction: | A | B | C | D | |
| Patient Risk Group: | Low | Medium | High | Highest | |
| Class of Precautions: | I | II | III | IV | |
| | | | | | Comments |
| Class I, II, III, IV | | | | | |
| 1. Methods in place to minimize dust raising. | | | | | |
| 2. Appropriate signage on doors to construction area. | | | | | |
| 3. Appropriate debris transport, i.e., covered cart, dedicated elevator, dedicated route, etc. | | | | | |
| 4. Area cleaned at end of the day/trash to designated area. | | | | | |
| 5. No visible signs of mice, insects, birds or other vermin. | | | | | |
| 6. Roof protection in place for projects on roof. | | | | | |
| 7. Displaced ceiling tiles immediately replaced. | | | | | |
| 8. Traffic pattern discourages patient exposure. | | | | | |
| 9. Water disruptions, if needed, are scheduled during low activity. | | | | | |
| Class II, III, IV | | | | | |
| 10. Barrier is solid and airflow goes from clean to dirty. | | | | | |
| 11. Surfaces water-misted to control dust while cutting. | | | | | |
| 12. Unused doors sealed with duct tape. | | | | | |
| 13. Air vents blocked off and sealed. | | | | | |
| 14. Walk off mats at work areas kept wet throughout the day. | | | | | |
| 15. Floors not showing visible track dirt outside construction area. | | | | | |
| 16. HVAC system for this area is sealed or isolated. | | | | | |
| Class III, IV | | | | | |
| 17. Critical barriers to seal area in place before beginning. | | | | | |
| 18. Negative air pressure maintained with HEPA equipped units. | | | | | |
| 19. Waste contained in tightly covered containers. | | | | | |
| 20. Transport carts sealed with tape if not a solid lid. | | | | | |

BID ISSUE
04/24/2015

VAMC WADE PARK
PROVIDE SMOKE SHELTER
PROJECT #:541-17-212

| | | |
|---|--|--|
| Class IV | | |
| 21. Patients relocated away from construction area. | | |
| 22. HVAC system for this area is isolated. | | |
| 23. Holes, pipes, conduits and punctures are sealed appropriately. | | |
| 24. Anteroom present and all personnel are required to pass through and be vacuumed with HEPA vacuum prior to leaving the site <i>or</i> they wear cloth or paper coveralls that are removed each time they leave the site. | | |
| 25. Barriers in place until final inspection by Safety and Infection Control and cleaning by ECS. | | |
| Initials: | | |

**SECTION 01 23 00
ALTERNATES**

PART 1 GENERAL

1.1 DESCRIPTION

This section administrative and procedural requirements for deduct alternates.

1.2 DEFINITIONS

- A. Deduct Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Deduct Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The credit for each deduct alternate is the net deduction from the Contract Sum to incorporate the deduct alternate into the Work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the deduct alternate into Project.
1. Include as part of each deduct alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of the deduct alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each deduct alternate. Indicate if deduct alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to deduct alternates.
- C. Execute accepted deduct alternates under the same conditions as other work of the Contract.
- D. Schedule: Refer to Specification 01 00 00, Paragraph 1.3 for a list of Alternates.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

- - - E N D - - -

SECTION 01 32 16.15
PROJECT SCHEDULES

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The Contractor shall develop a Critical Path Method (CPM) plan and schedule demonstrating fulfillment of the contract requirements (Project Schedule), and shall keep the Project Schedule up-to-date in accordance with the requirements of this section and shall utilize the plan for scheduling, coordinating and monitoring work under this contract (including all activities of subcontractors, equipment vendors and suppliers). Conventional Critical Path Method (CPM) technique shall be utilized to satisfy both time and cost applications.

1.2 CONTRACTOR'S REPRESENTATIVE:

- A. The Contractor shall designate an authorized representative responsible for the Project Schedule including preparation, review and progress reporting with and to the Contracting Officer's Representative (COR).
- B. The Contractor's representative shall have direct project control and complete authority to act on behalf of the Contractor in fulfilling the requirements of this specification section.
- C. The Contractor's representative shall have the option of developing the project schedule within their organization or to engage the services of an outside consultant. If an outside scheduling consultant is utilized, Section 1.3 of this specification will apply.

1.3 CONTRACTOR'S CONSULTANT:

- A. The Contractor shall submit a qualification proposal to the COR, within 10 days of bid acceptance. The qualification proposal shall include:
 - 1. The name and address of the proposed consultant.
 - 2. Information to show that the proposed consultant has the qualifications to meet the requirements specified in the preceding paragraph.
 - 3. A representative sample of prior construction projects, which the proposed consultant has performed complete project scheduling services. These representative samples shall be of similar size and scope.
- B. The Contracting Officer has the right to approve or disapprove the proposed consultant, and will notify the Contractor of the VA decision within seven calendar days from receipt of the qualification proposal. In case of disapproval, the Contractor shall resubmit another consultant within 10 calendar days for renewed consideration. The Contractor shall have their scheduling consultant approved prior to submitting any schedule for approval.

1.4 COMPUTER PRODUCED SCHEDULES

- A. The contractor shall provide monthly, to the Department of Veterans Affairs (VA), all computer-produced time/cost schedules and reports generated from monthly project updates. This monthly computer service will include: three copies of up to five different reports (inclusive of all pages) available within the user defined reports of the scheduling software approved by the Contracting Officer; a hard copy listing of all project schedule changes, and associated data, made at the update and an electronic file of this data; and the resulting monthly updated schedule in PDM format. These must be submitted with and substantively support the contractor's monthly payment request and the signed look ahead report. The COR shall identify the five different report formats that the contractor shall provide.
- B. The contractor shall be responsible for the correctness and timeliness of the computer-produced reports. The Contractor shall also responsible for the accurate and timely submittal of the updated project schedule and all CPM data necessary to produce the computer reports and payment request that is specified.
- C. The VA will report errors in computer-produced reports to the Contractor's representative within ten calendar days from receipt of reports. The Contractor shall reprocess the computer-produced reports and associated diskette(s), when requested by the Contracting Officer's representative, to correct errors which affect the payment and schedule for the project.

1.5 THE COMPLETE PROJECT SCHEDULE SUBMITTAL

- A. Within 45 calendar days after receipt of Notice to Proceed, the Contractor shall submit for the Contracting Officer's review; three blue line copies of the interim schedule on sheets of paper 765 x 1070 mm (30 x 42 inches) and an electronic file in the previously approved CPM schedule program. The submittal shall also include three copies of a computer-produced activity/event ID schedule showing project duration; phase completion dates; and other data, including event cost. Each activity/event on the computer-produced schedule shall contain as a minimum, but not limited to, activity/event ID, activity/event description, duration, budget amount, early start date, early finish date, late start date, late finish date and total float. Work activity/event relationships shall be restricted to finish-to-start or start-to-start without lead or lag constraints. Activity/event date constraints, not required by the contract, will not be accepted unless submitted to and approved by the Contracting Officer. The contractor shall make a separate written detailed request to the Contracting Officer identifying these date constraints and secure the Contracting Officer's written approval before incorporating them into the network diagram. The Contracting Officer's separate approval of the Project Schedule shall not excuse the contractor of this requirement. Logic events (non-work) will be permitted where necessary to reflect proper logic among work events, but must have zero duration. The complete working schedule shall reflect the Contractor's approach to scheduling the complete project. The final Project Schedule in its original form shall contain no contract changes or delays which may have been incurred during the final network diagram development period and shall reflect the entire contract duration as defined in the bid documents. These changes/delays shall be entered at the first update after the final Project Schedule has been approved. The Contractor should provide their requests for time and supporting time extension analysis for contract time as a result of contract changes/delays, after this update, and in accordance with Article, ADJUSTMENT OF CONTRACT COMPLETION.
- B. Within 30 calendar days after receipt of the complete project interim Project Schedule and the complete final Project Schedule, the Contracting Officer or his representative, will do one or both of the following:
1. Notify the Contractor concerning his actions, opinions, and objections.
 2. A meeting with the Contractor at or near the job site for joint review, correction or adjustment of the proposed plan will be scheduled if required. Within 14 calendar days after the joint review, the Contractor shall revise and shall submit three blue line copies of the revised Project Schedule, three copies of the revised computer-produced activity/event ID schedule and a revised electronic file as specified by the Contracting Officer. The revised submission will be reviewed by the Contracting Officer and, if found to be as previously agreed upon, will be approved.
- C. The approved baseline schedule and the computer-produced schedule(s) generated there from shall constitute the approved baseline schedule until subsequently revised in accordance with the requirements of this section.
- D. The Complete Project Schedule shall contain approximately 5 work activities/events.

1.6 WORK ACTIVITY/EVENT COST DATA

- A. The Contractor shall cost load all work activities/events except procurement activities. The cumulative amount of all cost loaded work activities/events (including alternates) shall equal the total contract price. Prorate overhead, profit and general conditions on all work activities/events for the entire project length. The contractor shall generate from this information cash flow curves indicating graphically the total percentage of work activity/event dollar value scheduled to be in place on early finish, late finish. These cash flow curves will be used by the Contracting Officer to assist him in determining approval or disapproval of the cost loading. Negative work activity/event cost data will not be acceptable, except on VA issued contract changes.
- B. The Contractor shall cost load work activities/events for guarantee period services, test, balance and adjust various systems in accordance with the provisions in Article, FAR 52.232 - 5 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS) and VAAR 852.236 - 83 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS).
- C. In accordance with FAR 52.236 - 1 (PERFORMANCE OF WORK BY THE CONTRACTOR) and VAAR 852.236 - 72 (PERFORMANCE OF WORK BY THE CONTRACTOR), the Contractor shall submit, simultaneously with the cost per work activity/event of the construction schedule required by this Section, a responsibility code for all activities/events of the project for which the Contractor's forces will perform the work.
- D. The Contractor shall cost load work activities/events for all BID ITEMS including ASBESTOS ABATEMENT. The sum of each BID ITEM work shall equal the value of the bid item in the Contractors' bid.

1.7 PROJECT SCHEDULE REQUIREMENTS

- A. Show on the project schedule the sequence of work activities/events required for complete performance of all items of work. The Contractor Shall:
 - 1. Show activities/events as:
 - a. Contractor's time required for submittal of shop drawings, templates, fabrication, delivery and similar pre-construction work.
 - b. Contracting Officer's and Architect-Engineer's review and approval of shop drawings, equipment schedules, samples, template, or similar items.
 - c. Interruption of VA Facilities utilities, delivery of Government furnished equipment, and rough-in drawings, project phasing and any other specification requirements.
 - d. Test, balance and adjust various systems and pieces of equipment, maintenance and operation manuals, instructions and preventive maintenance tasks.
 - e. VA inspection and acceptance activity/event with a minimum duration of five work days at the end of each phase and immediately preceding any VA move activity/event required by the contract phasing for that phase.

2. Show not only the activities/events for actual construction work for each trade category of the project, but also trade relationships to indicate the movement of trades from one area, floor, or building, to another area, floor, or building, for at least five trades who are performing major work under this contract.
 3. Break up the work into activities/events of a duration no longer than 20 work days each or one reporting period, except as to non-construction activities/events (i.e., procurement of materials, delivery of equipment, concrete and asphalt curing) and any other activities/events for which the COR may approve the showing of a longer duration. The duration for VA approval of any required submittal, shop drawing, or other submittals will not be less than 20 work days.
 4. Describe work activities/events clearly, so the work is readily identifiable for assessment of completion. Activities/events labeled "start," "continue," or "completion," are not specific and will not be allowed. Lead and lag time activities will not be acceptable.
 5. The schedule shall be generally numbered in such a way to reflect either discipline, phase or location of the work.
- B. The Contractor shall submit the following supporting data in addition to the project schedule:
1. The appropriate project calendar including working days and holidays.
 2. The planned number of shifts per day.
 3. The number of hours per shift.
- C. Failure of the Contractor to include this data shall delay the review of the submittal until the Contracting Officer is in receipt of the missing data.
- D. To the extent that the Project Schedule or any revised Project Schedule shows anything not jointly agreed upon, it shall not be deemed to have been approved by the COR. Failure to include any element of work required for the performance of this contract shall not excuse the Contractor from completing all work required within any applicable completion date of each phase regardless of the COR's approval of the Project Schedule.
- E. Compact Disk Requirements and CPM Activity/Event Record Specifications: Submit to the VA an electronic file(s) containing one file of the data required to produce a schedule, reflecting all the activities/events of the complete project schedule being submitted.

1.8 PAYMENT TO THE CONTRACTOR:

- A. Monthly, the contractor shall submit the AIA application and certificate for payment documents G702 & G703 reflecting updated schedule activities and cost data in accordance with the provisions of the following Article, PAYMENT AND PROGRESS REPORTING, as the basis upon which progress payments will be made pursuant to Article, FAR 52.232 - 5 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS) and VAAR 852.236 - 83 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS). The Contractor shall be entitled to a monthly progress payment upon approval of estimates as determined from the currently approved updated project schedule. Monthly payment requests shall include: a listing of all agreed upon project schedule changes and associated data; and an electronic file (s) of the resulting monthly updated schedule.
- B. Approval of the Contractor's monthly Application for Payment shall be contingent, among other factors, on the submittal of a satisfactory monthly update of the project schedule.

1.9 PAYMENT AND PROGRESS REPORTING

- A. Monthly schedule update meetings will be held on dates mutually agreed to by the COR and the Contractor. Contractor and their CPM consultant (if applicable) shall attend all monthly schedule update meetings. The Contractor shall accurately update the Project Schedule and all other data required and provide this information to the COR three work days in advance of the schedule update meeting. Job progress will be reviewed to verify:
 - 1. Actual start and/or finish dates for updated/completed activities/events.
 - 2. Remaining duration for each activity/event started, or scheduled to start, but not completed.
 - 3. Logic, time and cost data for change orders, and supplemental agreements that are to be incorporated into the Project Schedule.
 - 4. Changes in activity/event sequence and/or duration which have been made, pursuant to the provisions of following Article, ADJUSTMENT OF CONTRACT COMPLETION.
 - 5. Completion percentage for all completed and partially completed activities/events.
 - 6. Logic and duration revisions required by this section of the specifications.
 - 7. Activity/event duration and percent complete shall be updated independently.
- B. After completion of the joint review, the contractor shall generate an updated computer-produced calendar-dated schedule and supply the Contracting Officer's representative with reports in accordance with the Article, COMPUTER PRODUCED SCHEDULES, specified.

- C. After completing the monthly schedule update, the contractor's representative or scheduling consultant shall rerun all current period contract change(s) against the prior approved monthly project schedule. The analysis shall only include original workday durations and schedule logic agreed upon by the contractor and COR for the contract change(s). When there is a disagreement on logic and/or durations, the Contractor shall use the schedule logic and/or durations provided and approved by the COR. After each rerun update, the resulting electronic project schedule data file shall be appropriately identified and submitted to the VA in accordance to the requirements listed in articles 1.4 and 1.7. This electronic submission is separate from the regular monthly project schedule update requirements and shall be submitted to the COR within fourteen (14) calendar days of completing the regular schedule update. Before inserting the contract changes durations, care must be taken to ensure that only the original durations will be used for the analysis, not the reported durations after progress. In addition, once the final network diagram is approved, the contractor must recreate all manual progress payment updates on this approved network diagram and associated reruns for contract changes in each of these update periods as outlined above for regular update periods. This will require detailed record keeping for each of the manual progress payment updates.
- D. Following approval of the CPM schedule, the VA, the General Contractor, its approved CPM Consultant, RE office representatives, and all subcontractors needed, as determined by the SRE, shall meet to discuss the monthly updated schedule. The main emphasis shall be to address work activities to avoid slippage of project schedule and to identify any necessary actions required to maintain project schedule during the reporting period. The Government representatives and the Contractor should conclude the meeting with a clear understanding of those work and administrative actions necessary to maintain project schedule status during the reporting period. This schedule coordination meeting will occur after each monthly project schedule update meeting utilizing the resulting schedule reports from that schedule update. If the project is behind schedule, discussions should include ways to prevent further slippage as well as ways to improve the project schedule status, when appropriate.

1.10 RESPONSIBILITY FOR COMPLETION

- A. If it becomes apparent from the current revised monthly progress schedule that phasing or contract completion dates will not be met, the Contractor shall execute some or all of the following remedial actions:
1. Increase construction manpower in such quantities and crafts as necessary to eliminate the backlog of work.
 2. Increase the number of working hours per shift, shifts per working day, working days per week, the amount of construction equipment, or any combination of the foregoing to eliminate the backlog of work.
 3. Reschedule the work in conformance with the specification requirements.

- B. Prior to proceeding with any of the above actions, the Contractor shall notify and obtain approval from the COR for the proposed schedule changes. If such actions are approved, the representative schedule revisions shall be incorporated by the Contractor into the Project Schedule before the next update, at no additional cost to the Government.

1.11 CHANGES TO THE SCHEDULE

- A. Within 30 calendar days after VA acceptance and approval of any updated project schedule, the Contractor shall submit a revised electronic file (s) and a list of any activity/event changes including predecessors and successors for any of the following reasons:
 - 1. Delay in completion of any activity/event or group of activities/events, which may be involved with contract changes, strikes, unusual weather, and other delays will not relieve the Contractor from the requirements specified unless the conditions are shown on the CPM as the direct cause for delaying the project beyond the acceptable limits.
 - 2. Delays in submittals, or deliveries, or work stoppage are encountered which make rescheduling of the work necessary.
 - 3. The schedule does not represent the actual prosecution and progress of the project.
 - 4. When there is, or has been, a substantial revision to the activity/event costs regardless of the cause for these revisions.
- B. CPM revisions made under this paragraph which affect the previously approved computer-produced schedules for Government furnished equipment, vacating of areas by the VA Facility, contract phase(s) and sub phase(s), utilities furnished by the Government to the Contractor, or any other previously contracted item, shall be furnished in writing to the Contracting Officer for approval.
- C. Contracting Officer's approval for the revised project schedule and all relevant data is contingent upon compliance with all other paragraphs of this section and any other previous agreements by the Contracting Officer or the VA representative.
- D. The cost of revisions to the project schedule resulting from contract changes will be included in the proposal for changes in work as specified in FAR 52.243 - 4 (Changes) and VAAR 852.236 - 88 (Changes - Supplemental), and will be based on the complexity of the revision or contract change, man hours expended in analyzing the change, and the total cost of the change.
- E. The cost of revisions to the Project Schedule not resulting from contract changes is the responsibility of the Contractor.

1.12 ADJUSTMENT OF CONTRACT COMPLETION

- A. The contract completion time will be adjusted only for causes specified in this contract. Request for an extension of the contract completion date by the Contractor shall be supported with a justification, CPM data and supporting evidence as the COR may deem necessary for determination as to whether or not the Contractor is entitled to an extension of time under the provisions of the contract. Submission of proof based on revised activity/event logic, durations (in work days) and costs is obligatory to any approvals. The schedule must clearly display that the Contractor has used, in full, all the float time available for the work involved in this request. The Contracting Officer's determination as to the total number of days of contract extension will be based upon the current computer-produced calendar-dated schedule for the time period in question and all other relevant information.
- B. Actual delays in activities/events which, according to the computer-produced calendar-dated schedule, do not affect the extended and predicted contract completion dates shown by the critical path in the network, will not be the basis for a change to the contract completion date. The Contracting Officer will within a reasonable time after receipt of such justification and supporting evidence, review the facts and advise the Contractor in writing of the Contracting Officer's decision.
- C. The Contractor shall submit each request for a change in the contract completion date to the Contracting Officer in accordance with the provisions specified under FAR 52.243 - 4 (Changes) and VAAR 852.236 - 88 (Changes - Supplemental). The Contractor shall include, as a part of each change order proposal, a sketch showing all CPM logic revisions, duration (in work days) changes, and cost changes, for work in question and its relationship to other activities on the approved network diagram.
- D. All delays due to non-work activities/events such as RFI's, WEATHER, STRIKES, and similar non-work activities/events shall be analyzed on a month by month basis.

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SECTION 01 33 23
SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 - GENERAL

1.1 Refer to Articles titled SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (FAR52.236-21) and, SPECIAL NOTES (VAAR 852.236-91), in GENERAL CONDITIONS. The contractor has the primary responsibility for the overall management and control of submittals. Submittals are required by the contract to demonstrate that the proposed materials, systems, layouts, etc are in compliance with the contract. Submittals also regulate the timely flow of materials to be incorporated into work.

1.2 For the purposes of this contract, samples (including laboratory samples to be tested) , Submit for approval, all of the items specifically mentioned under the separate sections of the previously referenced requirements. The following text refers to all items collectively as SUBMITTALS.

1.3 SUBMITTAL REGISTER: The Contractor shall prepare a Submittal Register and submit all items specified in other sections of these specifications on that Submittal Register. Submit electronic file (one working spreadsheet file and one copy in PDF format) to the Contracting Officer for approval within 10 calendar days after Notice to Proceed. The Contractor shall keep this electronic file up-to-date and shall submit it to the Government (in PDF format) together with the monthly payment request. The approved Submittal Register will become the scheduling document and will be used to control submittals throughout the life of the contract. The Submittal Register and the progress schedules shall be coordinated. At a minimum the Submittal Register will include the following information for each submittal:

- A. Specification section
- B. Description of submittal
- C. Date submittal will be issued for review/approval
- D. Date submittal to be returned to contractor

1.4 Submit for approval, all of the items specifically mentioned under the separate sections of the specification, with information sufficient to evidence full compliance with contract requirements. Materials, fabricated articles and the like to be installed in permanent work shall equal those of approved submittals. After an item has been approved, no change in brand or make will be permitted unless:

- A. Satisfactory written evidence is presented to, and approved by Contracting Officer, that manufacturer cannot make scheduled delivery of approved item or;
- B. Item delivered has been rejected and substitution of a suitable item is an urgent necessity or;
- C. Other conditions become apparent which indicates approval of such substitute item to be in best interest of the Government.

BID ISSUE
04/24/2015

VAMC WADE PARK
PROVIDE SMOKE SHELTER
PROJECT #:541-17-212

D. SCHEDULING: Submittals covering component items forming a system or items that are interrelated shall be scheduled to be coordinated and submitted concurrently. Certifications to be submitted with the pertinent drawings shall be so scheduled. Adequate time (a minimum of 30 calendar days exclusive of mailing time) shall be allowed and shown on the Submittal Register for review and approval. No delay damages or time extensions will be allowed for time lost in late submittals. The Contractor shall carefully control his procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register."

1.5 Forward submittals in sufficient time to permit proper consideration and approval action by Government. Time submission to assure adequate lead time for procurement of contract - required items. Delays attributable to untimely and rejected submittals. Upon receipt of submittals, Architect-Engineer will assign a file number thereto. Contractor, in contract time for completion.

1.6 Submittals will be reviewed for compliance with contract requirements by Architect-Engineer, and action thereon will be taken by COR on behalf of the Contracting Officer.

1.7 Upon receipt of submittals, Architect-Engineer will assign a file number thereto. Contractor, in any subsequent correspondence, shall refer to this file and identification number to expedite replies relative to previously approved or disapproved submittals.

1.8 The Government reserves the right to require additional submittals, whether or not particularly mentioned in this contract. If additional submittals beyond those required by the contract are furnished pursuant to request therefor by Contracting Officer, adjustment in contract price and time will be made in accordance with Articles titled CHANGES (FAR 52.243-4) and CHANGES - SUPPLEMENT (VAAR 852.236-88) of the GENERAL CONDITIONS.

1.9 Schedules called for in specifications and shown on shop drawings shall be submitted for use and information of Department of Veterans Affairs and Architect-Engineer. However, the Contractor shall assume responsibility for coordinating and verifying schedules. The Contracting Officer and Architect-Engineer assumes no responsibility for checking schedules or layout drawings for exact sizes, exact numbers and detailed positioning of items.

1.10 Submittals must be submitted by Contractor only and shipped prepaid. Contracting Officer assumes no responsibility for checking quantities or exact numbers included in such submittals.

A. Submit samples in single units unless otherwise specified. Submit shop drawings, schedules, manufacturers' literature and data, and certificates in quadruplicate, except where a greater number is specified.

- B. Submittals will receive consideration only when covered by a transmittal letter signed by Contractor. Letter shall be sent via first class mail and shall contain the list of items, name of Medical Center, name of Contractor, contract number, applicable specification paragraph numbers, applicable drawing numbers (and other information required for exact identification of location for each item), manufacturer and brand, ASTM or Federal Specification Number (if any) and such additional information as may be required by specifications for particular item being furnished. In addition, catalogs shall be marked to indicate specific items submitted for approval.
1. A copy of letter must be enclosed with items, and any items received without identification letter will be considered "unclaimed goods" and held for a limited time only.
 2. Each sample, certificate, manufacturers' literature and data shall be labeled to indicate the name and location of the Medical Center, name of Contractor, manufacturer, brand, contract number and ASTM or Federal Specification Number as applicable and location(s) on project.
 3. Required certificates shall be signed by an authorized representative of manufacturer or supplier of material, and by Contractor.
- C. In addition to complying with the applicable requirements specified in preceding Article 1.9, samples which are required to have Laboratory Tests (those preceded by symbol "LT" under the separate sections of the specification shall be tested, at the expense of Contractor, in a commercial laboratory approved by Contracting Officer.
1. Laboratory shall furnish Contracting Officer with a certificate stating that it is fully equipped and qualified to perform intended work, is fully acquainted with specification requirements and intended use of materials and is an independent establishment in no way connected with organization of Contractor or with manufacturer or supplier of materials to be tested.
 2. Certificates shall also set forth a list of comparable projects upon which laboratory has performed similar functions during past five years.
 3. Samples and laboratory tests shall be sent directly to approved commercial testing laboratory.
 4. Contractor shall send a copy of transmittal letter to both COR and to Architect-Engineer simultaneously with submission of material to a commercial testing laboratory.
 5. Laboratory test reports shall be sent directly to COR for appropriate action.
 6. Laboratory reports shall list contract specification test requirements and a comparative list of the laboratory test results. When tests show that the material meets specification requirements, the laboratory shall so certify on test report.
 7. Laboratory test reports shall also include a recommendation for approval or disapproval of tested item.
- D. If submittal samples have been disapproved, resubmit new samples as soon as possible after notification of disapproval. Such new samples shall be marked "Resubmitted Sample" in addition to containing other previously specified information required on label and in transmittal letter.

- E. Approved samples will be kept on file by the COR at the site until completion of contract, at which time such samples will be delivered to Contractor as Contractor's property. Where noted in technical sections of specifications, approved samples in good condition may be used in their proper locations in contract work. At completion of contract, samples that are not approved will be returned to Contractor only upon request and at Contractor's expense. Such request should be made prior to completion of the contract. Disapproved samples that are not requested for return by Contractor will be discarded after completion of contract.
- F. Submittal drawings (shop, erection or setting drawings) and schedules, required for work of various trades, shall be checked before submission by technically qualified employees of Contractor for accuracy, completeness and compliance with contract requirements. These drawings and schedules shall be stamped and signed by Contractor certifying to such check.
1. For each drawing required, submit one legible photographic paper or vellum reproducible.
 2. Reproducible shall be full size.
 3. Each drawing shall have marked thereon, proper descriptive title, including Medical Center location, project number, manufacturer's number, reference to contract drawing number, detail Section Number, and Specification Section Number.
 4. A space 120 mm by 125 mm (4-3/4 by 5 inches) shall be reserved on each drawing to accommodate approval or disapproval stamp.
 5. Submit drawings, ROLLED WITHIN A MAILING TUBE, fully protected for shipment.
 6. One reproducible print of approved or disapproved shop drawings will be forwarded to Contractor.
 7. When work is directly related and involves more than one trade, shop drawings shall be submitted to Architect-Engineer under one cover.

1.11 Samples, shop drawings, test reports, certificates and manufacturers' literature and data, shall be submitted for approval to

Mike Long
FF&H Engineers
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Broadview Heights, OH 44147
mlong@ffhengineers.com

BID ISSUE
04/24/2015

VAMC WADE PARK
PROVIDE SMOKE SHELTER
PROJECT #:541-17-212

1.12 At the time of transmittal to the Architect-Engineer, the Contractor shall also send a copy of the complete submittal directly to the COR.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION (Not used)

- - - E N D - - -

(Name) CONSTRUCTION COMPANY

SITE SPECIFIC ACCIDENT PREVENTION PLAN

+

CONSTRUCTION HEALTH AND SAFETY PROGRAM

FOR

Smoke Shelter Addition

Veterans Affairs Medical Center – Wade Park

Cleveland, Ohio

Project number given by contracting avoid confusion

Safety Requirements

Site Specific Accident Prevention Plan - Sample

BID ISSUE
04/24/2015

VAMC WADE PARK
PROVIDE SMOKE SHELTER
PROJECT #:541-17-212

PROJECT # 541-17-212

CONTRACT #

RESPONSIBILITIES AND LINES OF AUTHORITY OF <NAME> CONSTRUCTION COMPANY

The following people have responsibilities and authority for corporate safety:

Safety Requirements

Site Specific Accident Prevention Plan - Sample

BACKGROUND INFORMATION (Prime)

- I. Contractor: **<Name>**
<Address>
<City, State Zip>
- II. Project Name: **Wade Park - <Name>**
- III. Project Description: **<Brief Description (541-xx-xxx)>**
- IV. Contractor Accident Record: **<Contractor provide OSHA Log information>**

A. RESPONSIBILITIES

1. Chief Corporate Safety Officer: **<Contact Name (Contact telephone #)>**
<Name> Construction Company
<Title>
2. Site Safety Responsibilities: **<Contact Name (Contact telephone #)>**
<Name> Construction Company
<Title>
3. Project Safety Consulting: **<Contact Name (Contact telephone #)>**
<Name> Construction Company

Safety Requirements

Site Specific Accident Prevention Plan - Sample

BID ISSUE
04/24/2015

VAMC WADE PARK
PROVIDE SMOKE SHELTER
PROJECT #:541-17-212

<Title>

BACKGROUND INFORMATION (SUBCONTRACTOR)

I. Contractor: <Name>
<Address>
<City, State Zip>

II. Project Name: Wade Park - <Name>

III. Project Description: <Brief Description>

IV. Contractor Accident Record: <Contractor provide OSHA Log
information>

A. RESPONSIBILITIES

1. Chief Corporate Safety Officer: <Contact Name (Contact telephone #)>
<Name> Construction Company
<Title>

2. Site Safety Responsibilities: <Contact Name (Contact telephone #)>
<Name> Construction Company
<Title>

Safety Requirements

Site Specific Accident Prevention Plan - Sample

BID ISSUE
04/24/2015

VAMC WADE PARK
PROVIDE SMOKE SHELTER
PROJECT #:541-17-212

Preparer:

<Contact Name (Phone #)>

<Contact Title>

<Name> Construction Company

Date

Safety Requirements

Site Specific Accident Prevention Plan - Sample

SCOPE OF WORK SUMMARY

Summary

This job consists of **<Basic Description> Please include the scope of work submitted for the project**

Pre-demolition:

<Describe the activity in sufficient detail to determine the safety program elements that will be required to be addressed in the body of the procedure – Section 6. Use the PCRA (Pre-Construction Risk Assessment) along with the Scope of Work to determine which elements need to be addressed for the pre-demolition phase.>

Demolition:

<Describe the activity in sufficient detail to determine the safety program elements that will be required to be addressed in the body of the procedure – Section 6. PCRA (Pre-Construction Risk Assessment) along with the Scope of Work to determine which elements need to be addressed for each of the demolition phase.>

Construction:

<Describe the activity in sufficient detail to determine the safety program elements that will be required to be addressed in the body of the procedure Section - 6. PCRA (Pre-Construction Risk Assessment) along with the Scope of Work to determine which elements need to be addressed for the construction phase.>

Safety Requirements

Site Specific Accident Prevention Plan - Sample

BID ISSUE
04/24/2015

VAMC WADE PARK
PROVIDE SMOKE SHELTER
PROJECT #:541-17-212

Safety Requirements

Site Specific Accident Prevention Plan - Sample

01 35 26 -8

1. SITE ACCESS:

- a) Parking onsite is not provided by the VAMC Cleveland at the Wade Park Facility
- b) Access into the facility will be through entrances located close to the work area to avoid patient care areas. The following entrance that will be used by **<Name>** Construction Company employees will be submitted in writing or on the drawings:

<Enter the specific building access to be used>

2. WORK AREA SECURITY:

- a) All **<Name>** Construction Company employees will wear company identification badges or those provided by VAMC Cleveland Police Service.
- b) Patients, visitors and unauthorized VAMC Cleveland employees will be kept out of work areas using locked doors, barricades and safety postings as appropriate.

3. PLAN FOR PREVENTION OF ALCOHOL AND DRUG ABUSE

<Review – replace with your own company policy if this doesn't work for you>

- a) Due to the nature of our work, it is critical that all employees are free from the adverse effects of drugs and/or alcohol. The company is committed to providing a safe workplace for all its employees. The goal of this policy is to maintain a safe and secure work environment that is free from the effects of alcohol and drug abuse.
- b) The intent of this policy is to be responsive to the employees health needs by the early recognition and treatment of chemical dependency problems and behavioral/medical

Safety Requirements

Site Specific Accident Prevention Plan - Sample

disorder, and to support the rights of the company and its employees to work within an alcohol / drug free environment.

c) This policy is not applicable to physician prescribed drugs. Employees on such medication(s), which may adversely affect their job performance, should promptly discuss the matter with their supervisor.

- Failure of the employee to so notify their supervisor can result in disciplinary action including discharge.
- It should be noted that while legal, prescribed drugs could adversely affect the safety of the employee and other employees on the site.
- All <Name> Construction employees are drug tested before hiring, periodically, and annually.

4. SITE SAFETY AUDITS (Inspections):

a) INTERNAL INSPECTIONS

The site supervisor, who is the <Name> Construction competent person, will conduct the Site Safety and Health inspections. The competent person's certifications are located in Appendix B. <Put the Certifications in the Appendix B.> There will two types of safety inspections that will be performed on this job site.

- (1) A weekly Safety and Health inspection and report will be conducted by the site supervisor. The inspection forms will document and track the following information:

- Any Violations
- Date of violation

Safety Requirements

Site Specific Accident Prevention Plan - Sample

- Nature of violation
 - Needed corrective action
 - Date of correction
 - Name of responsible person(s)
- (a) In addition to the above items he will also notify any employee and/or subcontractor in writing of any violations.
- (b) This information will be followed up on by the COR or Construction Safety Group, as needed and/or requires immediate attention to the violations. (Should he notify VA of findings?)
- (c) All safety inspection forms are reviewed to ensure that all noted corrective actions are within the applicable OSHA and Veterans Affairs Safety and Health Manual guidelines.
- (d) This documentation will be kept (readily available?) at the project field office, and will aid in the audits of the Accident Prevention Plan.

(2) The second type of Safety and Health Inspection will be a daily checklist.

- (a) This too, will be performed each workday onsite, by the site supervisor.
- (b) This documentation will be kept at the project field office, and will aid in the audits of the Accident Prevention Plan. (this too Should be made readily available?)

b) EXTERNAL INSPECTORS/CONSTRUCTION ROUNDS

- (1) At various times there may be announced and unannounced visits to the work area of any of the Contracted Construction Projects. They may be visited by

Safety Requirements

Site Specific Accident Prevention Plan - Sample

some or all of the members of the Construction Safety Inspection Group.

(2) Prior to the activity of cutting and/or welding, the COR for the Veterans

Affairs will be contacted to assist in scheduling a site inspection and submission for a burn permit.

(3) Prior to any activity including digging and/or excavating, the COR for

the Veterans Affairs will be contacted to assist in scheduling a site inspection and submission for a permit.

(4) Prior to any activity including the renovation and/or penetration of rated

walls, the COR for the Veterans Affairs will be contacted to assist in scheduling a site inspection and submission for a permit.

(5) Prior to any activity including the removal or repair of Asbestos

Containing Building Material, the COR for the Veterans Affairs will be contacted to assist in scheduling a site inspection and submission for a permit.

c) INSPECTIONS BY OUTSIDE PARTIES i.e., OSHA, EPA, etc.

(1) Presentation of Credentials - Upon arrival at the work site or facility, the Compliance Officer must display his or her credentials and will ask to meet with the appropriate employer representative.

(2) The contractor must notify the projects COR immediately upon the initial contact of the Compliance Officer's contact.

Safety Requirements

Site Specific Accident Prevention Plan - Sample

- (3) Opening Conference – During an opening conference, the compliance officer will explain the purpose of the inspection. The contractor's management representative must be prepared to discuss actions that have been taken to demonstrate their company's commitment to the health and safety of employees (e.g. work practices, safety and industrial hygiene standards, safety manuals, training conducted, internal inspections, etc).
- (4) An authorized employee representative will be given the opportunity to attend the opening conference and to accompany the compliance officer during the inspection. Employees may also be consulted during the conduct of the inspection. Employees who participate in the inspection, or are consulted by the compliance officer, are protected from discrimination for exercising their safety and health rights under the "Whistle Blowers Act".
- (5) A contractor management representative and a VAMC Cleveland Safety representative must accompany the compliance officer during the inspection and keep accurate notes of any actual or possible violations found by the compliance officer. Obvious violations detected by the compliance officer should be corrected on the spot where possible.
- (6) It is imperative that existing operations, reports, logs, etc. not be misrepresented to the compliance officer. The penalty for making false statements or representation to OSHA or its compliance officers is a maximum of \$10,000 and 6 months imprisonment. In addition, the offending party can be subject to discipline by the company up to and including discharge.
- (7) Closing Conference - After the inspection has been conducted, a closing conference will be held between the compliance officer, the employer and employee representatives and VAMC Cleveland. This is the best time, before possible issuance of a citation, to explain the company's position. It is imperative that we question any proposed findings or abatement periods that are unreasonable. Request that any citations be sent to the company with a copy to the VAMC Cleveland safety office.

Safety Requirements

Site Specific Accident Prevention Plan - Sample

5. SAFETY TRAINING /EDUCATION:

a) Site orientation training:

All employees on site will be required to attend a Safety Training Orientation at the start of the project, or before they begin work at the job site. The site supervisor, competent person, will conduct the training. Training on the applicable requirements of this Site Specific Training Plan is mandatory and must be documented.

b) Supervisor and employee safety meetings:

The primary site supervisor, who is the competent person (certifications located in Appendix B), will conduct the initial employee site safety orientation. Mandatory safety meetings will be held on a weekly basis. Safety and health topics will vary from week to week on subject matter, utilizing the 29 CFR 1910 and 29 CFR 1926 standards, along with the Veterans Affairs Safety and Health Program and issues raised during construction.

<Place documentation of training sign-in sheets and agenda in Appendix B>

c) Employee training:

<Name> Construction Company employees will be trained, at the site safety orientation on the following topics:

- When PPE is necessary.
- What PPE is necessary and which PPE has been selected for each process the employee operates.

Safety Requirements

Site Specific Accident Prevention Plan - Sample

- How to properly put on, take off, adjust, and wear PPE.

6. ACCIDENT REPORTING:

All <Name> Construction employees on site will be required to attend an “Accident and Event Reporting” Orientation class at the start of the project, or before they begin work at the job site. The site supervisor, competent person, will conduct the above mentioned training.

a) Accident investigations, reports, and logs:

The project manager and site supervisor will conduct all accident and near miss investigations. The site supervisor will maintain the OSHA 300 log. All documentation will be kept on the job site. Certifications for competent person(s) are located in Appendix B.

b) Immediate notification of major accidents:

Should a major accident occur, the following notifications will take place as soon as any injured person(s) are cared for:

<Contact Name, Title>

<Contact Name, Title>

<Contact Name, Title>

VA Safety Representative: Frank Wunderle

Safety Requirements

Site Specific Accident Prevention Plan - Sample

Local Emergency Services:

For Wade Park

| | |
|-----------------|---|
| Hospital | VA Wade Park Medical Facility 10701 East Blvd. Cleveland, Ohio 44106 Dial 2222 from any VA Phone |
| Hospital | University Hospitals 11100 Euclid Avenue Cleveland, Ohio 44106 911 / (216) 844-1000 |
| Fire Department | 911 / 216-664-6813 |
| Security | Dial 4207 from any VA Phone |

For Brecksville

| | |
|----------|---|
| Hospital | VA Brecksville Medical Facility 10000 Brecksville Rd.. Brecksville, Ohio 44141 Dial 2222 from any VA Phone |
|----------|---|

Safety Requirements

Site Specific Accident Prevention Plan - Sample

BID ISSUE
04/24/2015

VAMC WADE PARK
PROVIDE SMOKE SHELTER
PROJECT #: 541-17-212

| | |
|-----------------|--|
| Hospital | Marymount medical Center 2001 East Royalton Rd. Broadview Hts., Ohio 44147 440.717.5800 |
| Fire Department | 911 / 440-526-2640 |
| Security | Dial 4207 from any VA Phone |

This listing will be posted in the field office.

c) Accident response plan:

<Name> Construction Company intends to make certain all emergency incidents are handled in a proper and safe manner giving priority to the following:

- Life Safety
- Property Conservation
- Emergency Situation Investigation
- Return to Normal Operations

d) Exposure data / man hours worked:

Safety Requirements

Site Specific Accident Prevention Plan - Sample

- (1) This section covers the following operations **<Fill in operation/s requiring additional training>** unless the employer can demonstrate that the operation does not involve employee exposure or the reasonable possibility for employee exposure to safety or health hazards. Example; (a negative impact statement or asbestos abatement)
- (2) This information will be maintained by the site supervisor and verified by **<Contact Name>**. A daily log will be maintained of all man hours worked. This information will also be used to determine the final TIR for the project. Any data collected will be submitted to the COR for their report.

7. EMERGENCY RESPONSE PLAN:

This plan covers the actions of all **<Name>** Construction employees. All subcontractors on site will be required to submit for approval, to **<Name>** Construction Company, their own site specific Emergency Response Plan. If not adequate, the subcontractor and their employees must be orientated to the **<Name>** Construction Company's "SITE SPECIFIC EMERGENCY RESPONSE PLAN", before they can begin work at this site.

a) Chemical Safety:

As part of this program, **<Name>** Construction Company will inform subcontractors, or their representatives of the site emergency response procedures and any potential fire, explosion, health, safety, or other hazards.

The following procedures address emergency response as follows:

- Pre-emergency planning and coordination with outside parties:

Safety Requirements

Site Specific Accident Prevention Plan - Sample

VAMC (COR) will receive notification of date to start work, along with MSDS's of all substances brought onto the facility.

- Personal roles, lines of authority, training, and communication:

The personnel utilizing chemicals will contain the substances brought onto the facility. Plumbers will contain and handle all compressed gas cylinders, providing they have been trained and documented.

In the case where a situation occurs that they cannot handle, all employees will be trained on evacuating the area, notifying the on-site supervisor, and workers in the immediate worksite.

- Emergency recognition and prevention:

All workers will, at the safety orientation, be informed of this site-specific emergency response plan and procedures.

All workers will be responsible to recognize hazards and their prevention, practice this at all times on the worksite.

All workers will be responsible to answer question from surveyors about general safety, health, and emergency procedures wherever they are on site.

b) Emergency plan for severe weather:

For the site-specific severe weather conditions that employees may encounter during the project, <Name> Construction Company has developed the following procedures. First, <Name> Construction Company employees will adhere to all NWS warnings and advisories. For snowfall, the policy for workers is that a Level Three emergency, which is predicted heavy snow fall, or other dangerous weather conditions.

Safety Requirements

Site Specific Accident Prevention Plan - Sample

- Safe distances and places of refuge:

All workers at this site will be informed of the designated location of the safe zone. This will also be posted in the field office for all to be reminded of. In the event of an emergency occurrence, and the Local Fire Department, or any other entity is summoned, all workers will report to this zone to be accounted for.

- Site security and control:

In the event of an emergency, workers will notify the site supervisor or project manager of the situation, at that time, workers will report to the safe zone. The site supervisor and/or project manager will notify security and any other applicable authorities. Staying away from the immediate situation and not allowing any unauthorized personnel to enter until proper authorities arrive.

- Evacuation routes and procedures:

Any work will be performed on the interior of the building. Evacuation plans are posted in various locations throughout work area by the VA.

- Decontamination:

This would be required if there is a possibility of a large spill of hazardous material with the potential of contaminating contractor employees. Small spills and personnel contaminations are expected to be cleaned up using the contractors Hazard Communication program and associated MSDS requirements.

c) Medical support:

Safety Requirements

Site Specific Accident Prevention Plan - Sample

It will be the duty of all workers onsite, including subcontractors, to immediately report to the site supervisor and/or project manager, COR's any and all emergencies.

The following are items of concern regarding the handling of all medical support requirements:

(1) On site:

- For incidents occurring on site at Wade Park Veterans Affairs Medical Center or Brecksville Veterans Affairs Medical Center; the victim(s) will be stabilized prior to be relocated to another institution.
- For non-emergency support first aid supplies will be kept at the <Name> Construction Company field office. All subcontractors will be required to supply properly trained personnel as well as their own first aid supplies.
- All supplies will be subject to our safety inspections. No one will perform first aid or CPR unless properly trained, and verification of certification is on file at the jobsite.
-

(2) Off site:

- For the Wade Park location, University Hospital Medical Center is located at 11100 Euclid Avenue (216) 844-1000. For the Brecksville location, Marymount medical Center is located on 2001 East Royalton Rd., Broadview Hts., OH 44147.

Safety Requirements

Site Specific Accident Prevention Plan - Sample

- Maps are posted and available for all contractors on site (See Appendix A).
- Emergency medical treatment and first aid:
- Emergency alerting and response procedures:
- It will be the duty of all workers onsite, including subcontractors, to immediately respond to the COR's, Construction Safety Team or Outside Inspectors from governmental agencies or agencies approving accreditation regarding their function during an emergency.

(3) Posting of emergency telephone numbers:

The posting of these Emergency Telephone Numbers will be in the job field office, where all workers will have access to them. All employees and subcontractors will be made aware of these and the location at the safety orientation. The numbers are as follows:

Hospital

Wade Park Veterans Affairs Medical Center

Dial 2222 from any VA Phone

University Hospital

911 / (216) 844-1000

Fire Department

911 / (216) 664-6813

Safety Requirements

Site Specific Accident Prevention Plan - Sample

Security

Dial 4207 from any VA Phone

d) Hazard communication program:

This site specific Hazard Communication Plan has been implemented in accordance with 29 CFR 1910.1200.

All areas in which hazardous chemicals will be stored shall have the proper label and/or signs. The MSDS for all chemicals on site will be located in a book labeled MSDS, in the project field office.

The training of employees and subcontractors will be as follows:

- Where to find this program
- What is in this program
- All chemicals on this jobsite
- What is an MSDS
- How to find specific information on an MSDS
- Labeling system
- What area these chemicals are stored in, map indicating
- The proper handling procedures for these chemicals
- Spill/release clean up protocol

Safety Requirements

Site Specific Accident Prevention Plan - Sample

Should there be an immediate threat to life or property, the emergency response plan for the installation, which is to be on file at the field office.

It is mandatory that all subcontractors submit, before a new chemical is introduced to the worksite, that the proper MSDS is submitted to the site supervisor/project manager. It will be the responsibility of the site supervisor to inform all employees and subcontractors of the new chemical(s), introduce the MSDS, and the potential hazards of that chemical. The site supervisor and/or project manager will have the responsibility to notify the Contracting Officer / COR of any and all new chemicals brought onto the facility.

Chemical storage areas, if needed, to be located per VA designated location.

- e) CORRECTIVE ACTIONS INVOLVING CLEAN-UP OPERATIONS AT SITES COVERED BY THE RESOURCE CONSERVATION AND RECOVERY ACT OF 1976 (RCRA) AS AMENDED (42 W.S.C. 6901 ET SEQ).

Clean-up operations required by a governmental body, whether Federal, state, local or other involving hazardous substance that are conducted at uncontrolled hazardous waste sites (including, but not limited to, the EPA's National Priority Site List (NPL), state priority site lists, sites recommended for the EPA, NPL, and initial investigations of government identified sites which area conducted before the presence or absence of hazardous substances has been ascertained;

Voluntary clean-up operations at sites recognized by Federal, state, local or other governmental bodies as uncontrolled hazardous waste sites;

Operations involving hazardous waste that area conducted at treatment, storage, disposal

Safety Requirements

Site Specific Accident Prevention Plan - Sample

(TSD) facilities regulated by 40 CFR Parts 264 and 265 pursuant to RCRA; or by agencies under agreement with U.S.E.P.A. to implement RCRA regulations; and Emergency response operations for releases of, or substantial threats of releases of, hazardous substances with regard to the location of the hazard.

8. FIRE PREVENTION PLAN:

We at <Name> Construction Company limit our employees participation to the use of portable fire extinguishers. The site supervisor at safety orientation will cover this Plan. The following topics will include:

- a) All areas controlled by the primary contractor are required to maintain fire protection during their occupancy. As a minimum smoke detectors and heat sensors shall be in place whenever the areas original fire protection has been compromised.
- b) All fire extinguishers must be checked and tagged every thirty day
- c) The general principles of fire extinguisher use and the hazards involved with incipient stage firefighting.
- d) Actions to be taken by authorized person(s)
 - (1) Evacuate area.
 - (2) Notify site supervisor and/or project manager.
 - (3) Determine if fire is incipient
 - (4) Utilize fire extinguisher.
 - (5) If fire or smoke is too great, report to safe zone.
 - (6) Make call to Fire Department if instructed by supervisor and/or project

Safety Requirements

Site Specific Accident Prevention Plan - Sample

manager.

e) Actions to be taken by unauthorized person(s)

- (1) Evacuate area
- (2) Notify supervisor and/or project manager.
- (3) Report to safe zone.
- (4) Make call to Fire Department if instructed by site supervisor and/or project manager.

f) Only approved fire extinguishers will be onsite and checked on a daily basis by the site supervisor. These will be located in the following areas, but not limited to:

- (1) Portable Fire Extinguishers
- (2) Individual Roles and Responsibilities
- (3) Fire Watch
- (4) Response Plans
- (5) Safe Zone
- (6) Notification
- (7) Site Mapping
- (8) Inside field office.
- (9) In any area where cutting or welding is taking place

g) The following sections listed below are all part of this Accident Prevention Plan. The information below contains additional requirements that are part of this Fire Prevention Plan:

Safety Requirements

Site Specific Accident Prevention Plan - Sample

- Safety and Health Inspections
- Firefighting Plan
- Posting of Emergency Numbers
- Hazard Communication Program
- Site Sanitation Plan

- (1) The risk of a job site fire can be avoided through; safety and health inspections, housekeeping, proper maintenance, proper storage and handling, ensuring all employees and subcontractors are performing their designated work duties properly, the handling of supplies and equipment as directed, following all guidelines set forth through operating manuals, instructions, and training,
- (2) All employees and subcontractors require the proper storage of combustibles. Combustible liquids must be stored and covered in approved containers.
- (3) All chemical spills including, of course, combustible liquids, must be cleaned up immediately.
- (4) All chemical and chemical products will be handled and stored in accordance with the procedures noted on their individual MSDS

Note: Care must be taken when cleaning up chemical spills. Information on appropriate personal protective equipment, proper disposal, proper cleanup procedures, required ventilation, etc is found on the products MSDS.

- (5) Cleanup materials and damaged containers must be properly disposed.

Safety Requirements

Site Specific Accident Prevention Plan - Sample

- (6) Combustible liquids and trash must be segregated and stored away from ignition sources.
- (7) Approved portable fire extinguishers will be checked on daily basis, ensuring they are charged and ready for use.
- (8) Smoking is not permitted inside the facility. Only designated areas by the VA will be permitted (outside), with smoking debris discarded in designated areas..
- (9) Debris will not be allowed to accumulate on the job site and will be maintained daily.
- h) Submission of a Burn Permit. **<Name>** Construction will submit a Burn Permit to the COR to perform acetylene oxygen welding, brazing and cutting, the following precautionary measures will be required as part of this permit along with any additional requirements by the VA Medical Center Policy 138-012 (Hot Work):
 - (1) Inspect all surroundings and equipment to insure that combustible substances are not present in any area where contact of metal at a temperature above the flashpoint of any compound is possible.
 - (2) Ensure that no open containers or spills of combustible substances are present.
 - (3) Ensure that ignition is not possible by conduction, convection, radiation, or dispersion of molten metal.

Safety Requirements

Site Specific Accident Prevention Plan - Sample

(4) Proper protection equipment and practices will be used, i.e., fireproof blankets, removal of combustible materials where practicable, and portable fire extinguishers of proper type on hand.

(5) When the above operations are in use a continuous Fire Watch will be performed while equipment is being used.

(6) Training in fire protection will occur at the site safety orientation. This training shall include the following topics, but not limited to:

a. <List of Topics>

9. SITE SAFETY RULES:

<Name> Construction Company has developed a comprehensive safety and health program that addresses our specific safety and health concerns and provides guidance for the performance of our individual job tasks within the framework of appropriate Occupational Safety and Health Administration (OSHA) standards.

Safety requires not only that each person understand and perform individual tasks in a safe manner, but also that each individual is aware of his/her surroundings and is actively involved in the safety and health of others.

a) No Smoking: Smoking is not permitted inside the facility. Only designated areas by the VA will be permitted (outside), with smoking debris discarded in designated areas.

Safety Requirements

Site Specific Accident Prevention Plan - Sample

- b) Accidents: In the event of an emergency, workers will notify the site supervisor or project manager of the situation, at that time, workers will report to the safe zone. The site supervisor and/or project manager will notify security and any other applicable authorities.

The goals for all projects are as follows:

(1) Zero accident rate

(2) Zero injury/illness rate

(3) Compliance with all applicable Local, State, OSHA standards and Veterans Affairs Safety Directives

- c) Hard Hats: Head Protection will be as follows:

- All workers on this site will be required to wear approved hard hats when working in the close proximity of heavy equipment and where structural steel is being hoisted
- In the area where another workers activities may exposing them to injury.

- d) Hazard Reporting: Each employee is encouraged to contact their Supervisor immediately should a safety or health risk exist so that corrective action may be taken immediately.

- e) Controlled Substances: Therefore, the following actions are strictly prohibited and will prompt disciplinary action up to and including consideration for immediate discharge:

- (1) The illegal use, sale, arranging for sale, possession or manufacturing

Safety Requirements

Site Specific Accident Prevention Plan - Sample

of narcotics, drugs or controlled substances while on the job or on VA property.

(2) The use of alcohol or illegal drugs while on the job or VA property.

- f) Safety Devices: **<Name>** Construction Company has fulfilled all required Safety and Health Plans and Programs according to regulation, and has installed all required safety device for the equipment being used for the tasks. Failure to use or to disable the mentioned safety device relating to CFR 1910 and 1926 standards to ensure 100% safety will be grounds for review .

The goal is to provide the company and its workers protection against those individuals who refuse to act in a consistently safe manner.

Without proper enforcement, the policy will not be able to deliver the intended results. Therefore, it is essential that all employees be held accountable to these guidelines for disciplinary actions up to and including discharge.

g) Personnel Protective Equipment: Procedures for implementing an effective PPE policy in accordance with 29 CFR 1910.132, will be as follows:

- (1) During a pre-construction walk through, **<Contact Name>**, the Project Manager, will perform a job site hazard assessment.

- (b) HAZARD ASSESSMENT: The purpose of the survey is to identify sources of hazards to workers and co-workers. The documentation of this hazard assessment is located in PCRA (Pre-Construction Risk Assessment)

Safety Requirements

Site Specific Accident Prevention Plan - Sample

(c) POTENTIAL HAZARD SOURCES **<Adjust based on scope of work>**

- **<Surfaces that could become slick, uneven walking and working surfaces>**
- **<Welding / Brazing Hazards>**
- **<Quality Air Control>**
- **<Electrical Hazards>**
- **<Potential Overhead Obstructions (above ceiling)>**
- **<Fall Protection>**
- **<Rolling or pinching objects>**
- **<Sharp objects that might pierce feet or cut hands>**
- **<Motion that includes tool movement, moving machinery, or machine parts, or movement of personnel that could result in collision with stationary objects.>**

(d) EMPLOYEE TRAINING: **<Name>** Construction Company employees will be trained, at the site safety orientation on the following topics:

- When PPE is necessary.
- What PPE is necessary and which PPE has been selected for each process the employee operates.
- How to properly put on, take off, adjust and wear PPE.

Safety Requirements

Site Specific Accident Prevention Plan - Sample

- (2) Each of the basic hazards has been reviewed and a determination made as to the type, level of risk, and seriousness of potential injury.
- When exposure to hazards cannot be engineered completely out of normal operations or maintenance work.
 - When safe work practices cannot provide sufficient additional protection.
 - A Final method of control is through the use of protective clothing or equipment. These include eye protection, steel-toed shoes, hard hats, hearing protection, gloves, and fall protection
- (3) Consideration has been given to the possibility of exposure to several hazards at once. The general procedure for determining appropriate protective equipment is to:
- Identify the potential hazards and the type of protective equipment that is available, and what protection it provides.
 - Compare the capabilities of various types of PPE with the hazards associated with the environment.
 - Select the PPE, which provides a level of protection greater than the minimum required to protect employees from the hazards.
 - Select PPE that will fit each employee properly and provides protection from the hazard.
 - The Hazard Assessment Worksheet is located in Appendix D.
- h) Horseplay: Safety training needs will be identified by continual reassessment of our work methods, equipment and job sites as well as employee and management input. Observation of unsafe acts will be addressed immediately.

Safety Requirements

Site Specific Accident Prevention Plan - Sample

i) Reporting Under the Influence:

(1) Arriving at work or working under the influence of alcohol or illegal drugs, narcotics or controlled substances.

(2) Any illegal substance confiscated pursuant to this policy will be turned over to the proper authorities.

j) Flammable Liquid Storage: It is mandatory that all subcontractors submit, before a new chemical is introduced to the worksite, that the proper MSDS is submitted to the site supervisor/project manager. It will be the responsibility of the site supervisor to inform all employees and subcontractors of the new chemical(s), introduce the MSDS, and the potential hazards of that chemical. The site supervisor and/or project manager will have the responsibility to notify the Contracting Officer / COR of any and all new chemicals brought onto the facility.

k) Heavy Equipment Operation

10. WEEKLY CONTRACTOR REVIEWS:

a) The primary site supervisor, who is the competent person (certifications in Appendix will conduct the initial employee site safety orientation.

b) Mandatory safety meetings will be held on a weekly basis. Safety and health topics will vary from week to week on subject matter, utilizing the 29 CFR 1910 and 29 CFR 1926 standards, along with the Veterans Affairs Safety and Health Program and issues raised during construction.(Place documentation of training sign-in sheets and agenda in Appendix B)

Safety Requirements

Site Specific Accident Prevention Plan - Sample

c) Safety takes a commitment from all personnel within our organization. Weekly Training will be interactive with an opportunity for all to actively participate, ask questions, make suggestions, and refer to our written policies and procedures.

11. COMPETENT PERSON:

a) A Site Safety and Health Officer (SSHO) will be provided at the work site at all times to perform safety and occupational health management, surveillance, inspections, and safety enforcement for the Contractor and subcontractors.

b) The SSHO will be employed by the prime. SSHO qualifications with education certificates will be listed in Appendix B.

d) There will be a competent person for maintaining a Health Hazard Control and Respiratory Protection Program. They will conduct and document a hazard assessment in accordance with Section 06 to identify and evaluate the need and level of protection required for the activities being scheduled. (What form of documentation).

d) Conduct daily safety and health inspections and maintain a written log which includes area/operation inspected, date of inspection, identified hazards, recommended corrective actions, estimated and actual dates of corrections. Safety inspection logs shall be attached to the Contractors daily quality control report. Current "Safety Logs" shall be readily available upon request.

12. WRITTEN PROTOCOLS FOR OUTSIDE INSPECTIONS:

Safety Requirements

Site Specific Accident Prevention Plan - Sample

a) Presentation of Credentials - Upon arrival at the work site or facility, the OSHA compliance officer must display his or her credentials and will ask to meet with the appropriate employer representative.

b) The contractor must notify the COR immediately upon the initial OSHA Contact.

- (1) Opening Conference – During an opening conference, the compliance officer will explain the purpose of the inspection. Contractor Management representatives must be prepared to discuss actions that have been taken to demonstrate their company's commitment to the health and safety of employees (e.g. work practices, safety and industrial hygiene standards, safety manuals, training conducted, internal inspections, etc).
- (2) An authorized employee representative will be given the opportunity to attend the opening conference and to accompany the compliance officer during the inspection. Employees may also be consulted during the conduct of the inspection. Employees who participate in the inspection, or are consulted by the compliance officer, are protected under the OSHA act from discrimination for exercising their safety and health rights.
- (3) A contractor management representative and a VAMC Cleveland Safety representative must accompany the compliance officer during the inspection and keep accurate notes of any actual or possible violations found by the compliance officer. Obvious violations detected by the compliance officer should be corrected on the spot where possible.
- (4) It is imperative that existing operations, reports, logs, etc. not be misrepresented to the compliance officer. The penalty for making false statements or representation to OSHA or its compliance officers is a maximum of \$10,000 and 6 months imprisonment. In addition, the offending party can be subject to discipline by the company up to and including discharge

Safety Requirements

Site Specific Accident Prevention Plan - Sample

- (5) Closing Conference - After the inspection has been conducted, a closing conference will be held between the compliance officer, the employer and employee representatives and VAMC Cleveland. This is the best time, before possible issuance of a citation, to explain the company's position. It is imperative that we question any proposed findings or abatement periods that are unreasonable. Request that any citations be sent to the company with a copy to the VAMC Cleveland safety office.

13. SUBCONTRACTOR SITE SPECIFIC SAFETY PLAN:

As part of employment with <Name> Construction Company, **employees** are required to comply with all aspects **of their** corporate level "Safety and Health Plan".

- Supervisors are expected and required to comply with all aspects of the corporate level "Safety and Health Plan" as well as to enforce all applicable requirements at the jobsite.
- Supervisors are expected and required to complete all necessary site safety documentation in a complete and timely manner.
- Supervisors are required to report all safety incidents to the main office as soon as possible. The projects COR is to be notified ASAP. The above items represent the method used to ensure our goals are met.

14. REQUIRED POSTERS:

Safety Requirements

Site Specific Accident Prevention Plan - Sample

This Policy Statement will be conspicuously posted in the job site office along with all other required postings including the OSHA Form 300, Log and Summary of Occupational Injuries and Illnesses.

15. SUBCONTRACTOR/SUPPLIERS ORIENTATION PROGRAM:

a) Identification of subcontractors:

<Name of Subcontractor> (List all subcontractors expected to be on site)

b) Controlling and coordination of subcontractors and suppliers:

Suppliers will be under close supervision during material delivery and pick-up. Communication with suppliers will be important to ensure loads are put in designated areas, and supplier is made aware of any immediate hazards in the area he/she will be in. A project schedule has been coordinated and submitted for approval for the coordination of the scope of work being performed.

c) SAFETY RESPONSIBILITIES OF SUBCONTRACTORS AND SUPPLIERS:

All subcontractors will be responsible to Submit and implement their corporate level Safety and Health Plan as appropriate for the project. Subcontractor shall submit these documents to <Name> Construction Company for approval prior to the start of their activities on the work site. In addition, they will be responsible for adhering to all applicable OSHA and the Veterans Affairs Safety and Health Program requirements. These documents will be verified through our own site safety inspections and meetings.

In the event that a subcontractor does not have the required safety and health programs, their employees will receive training utilizing <Name> Construction Company's safety and health programs prior to accessing the work site. This training will be documented and compliance with the provisions of <Name> Construction Company's Safety and Health programs will be mandatory as well as being readily accessible.

Safety Requirements

Site Specific Accident Prevention Plan - Sample

16. REPORTING OF CATASTROPHIC EVENTS:

It is the policy of <Name> Construction Company to provide a work environment that is inherently safe. The safety and health of our employees is of primary importance as they are our most important resource

- Pre-emergency planning and coordination with outside parties:

VAMC (COR) will receive notification of date to start work, along with MSDS's of all substances brought onto the facility.

- Personal roles, lines of authority, training, and communication:

The personnel utilizing chemicals will contain the substances brought onto the facility. Plumbers will contain and handle all compressed gas cylinders, providing they have been trained and documented.

In the case where a situation occurs that they cannot handle, all employees will be trained on evacuating the area, notifying the on-site supervisor, and workers in the immediate worksite.

- Emergency recognition and prevention:

All workers will, at the safety orientation, be informed of this site-specific emergency response plan and procedures.

Safety Requirements

Site Specific Accident Prevention Plan - Sample

All workers will be responsible to recognize hazards and their prevention, practice this at all times on the worksite.

All workers will be responsible to answer question from surveyors about general safety, health, and emergency procedures wherever they are on site.

- Safe distances and places of refuge:

All workers at this site will be informed of the designated location of the safe zone. This will also be posted in the field office for all to be reminded of. In the event of an emergency occurrence, and the Local Fire Department, or any other entity is summoned, all workers will report to this zone to be accounted for.

- Site security and control:

In the event of an emergency, workers will notify the site supervisor or project manager of the situation, at that time, workers will report to the safe zone. The site supervisor and/or project manager will notify security and any other applicable authorities. Staying away from the immediate situation and not allowing any unauthorized personnel to enter until proper authorities arrive.

- Evacuation routes and procedures:

Any work will be performed on the interior of the building. Evacuation plans are posted in various locations throughout work area by the VA.

- Decontamination:

Safety Requirements

Site Specific Accident Prevention Plan - Sample

This would be required if there is a possibility of a large spill of hazardous material with the potential of contaminating contractor employees. Small spills and personnel contaminations are expected to be cleaned up using the contractors Hazard Communication program and associated MSDS requirements.

- Emergency medical treatment and first aid:
- Emergency alerting and response procedures:

It will be the duty of all workers onsite, including subcontractors, to immediately report to the site supervisor and/or project manager, COR's any and all emergencies

17. Site specific plans to address PCRA:

- a. Only those hazards identified as "yes" on the PCRA need to be addressed.
- b. Modify the description of the safety precautions as needed to address the specific concern. You may refer to a company policy or company rule book to describe the safety precautions or safety plan; however, we will need to have a copy of your plan or policy on file.
- c. To place a check in the box
 - right click on the box
 - Click "Properties"
 - Click "Checked"
 - Click "OK"

Safety Requirements

Site Specific Accident Prevention Plan - Sample

BID ISSUE
04/24/2015

VAMC WADE PARK
PROVIDE SMOKE SHELTER
PROJECT #:541-17-212

Safety Requirements

Site Specific Accident Prevention Plan - Sample

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Pre Construction Risk Assessment (PCRA)

| | Description of safety precautions or reference to contractor Safety Procedures |
|--------------------------|---|
| <input type="checkbox"/> | <p>(1) Respiratory Protection Plan</p> <ul style="list-style-type: none">○ Describe of ACTIVITY requiring respiratory protection if applicable○ NEED documentation of training.○ Need documentation of fit test. |
| <input type="checkbox"/> | <p>(2) Hearing: Protection Plan Any area with noise levels at or above 85dba will be required to wear hearing protection. When workers are utilizing loud equipment, or being exposed to such levels, hearing protection shall be provided.</p> |
| <input type="checkbox"/> | <p>(3) PPE other: Personal protective equipment (PPE) includes hard hats, gloves, safety glasses, steel-toed shoes/boots, hearing protection, and personal fall protection.</p> <p>Eye protection will be as follows:</p> <ul style="list-style-type: none">○ Safety glasses used for any worker performing, observing tasks that may result in flying objects, dust, or in the area where another workers activities may exposing them to eye injury.○ During welding/cutting operations, the required filter lenses will be utilized according to the operation, electrode size and arc current. <p>Foot Protection:</p> <ul style="list-style-type: none">○ All workers will be required to wear the appropriate foot protection. |

Safety Requirements

Site Specific Accident Prevention Plan - Sample

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| | <ul style="list-style-type: none">○ Steel-toed shoes/boots are mandatory. <p>Hand Protection:</p> <ul style="list-style-type: none">○ Workers may be exposed to hand injuries from;<ul style="list-style-type: none">▪ sharp objects,▪ abrasive materials▪ and weather.○ Gloves designed to protect against the specific hazard encountered are an effective means of reducing such risks and will be used on this project. |
| <input type="checkbox"/> | (4) Overhead hazards: <(Example)There will be X critical lifts required on this project. A crane will be utilized to load new materials onto Xth floor roof and remove demolished material from the roof. A plan will be submitted and approved prior to this work being performed.> |
| <input type="checkbox"/> | (5) Confined space: Procedures for entering a confined space depend on the type of confined space and the scope of work associated with the entry. <ul style="list-style-type: none">a) The VAMC Cleveland Confined Space Entry Program provides the detailed information necessary for regulatory compliance. The contractor may use the VAMC Program or their own providing that it meets regulatory compliance and is reviewed and approved before entry is made.b) Under no circumstances should a person enter into a posted confined space without notifying the COR. A "Shutdown Request" reviewed by Occupational Health and Safety and approved by the COR will be used for this notification.c) Sub-basements are considered non-permit required confined spaces unless welding is performed or other hazards introduced that may create a hazardous atmosphere. When atmospheric hazards are identified then the sub-basements will be worked under the alternate procedure provisions provided |

Safety Requirements

Site Specific Accident Prevention Plan - Sample

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| | <p>that continuous ventilation is used to control the atmospheric hazard.</p> <p>d) Areas posted as "Permit Required" confined spaces will not be entered unless the hazards are eliminated and the space is reclassified. All tanks, voids, ventilation ducts and sewers are considered "Permit Required" confined spaces unless a hazard assessment is conducted and the space is reclassified.</p> <p>e) Employees entering confined spaces will be trained. Training will be based on the Confined Space Entry Program, ANSI National Standard "Safety Requirements for working in Tanks and other Confined Spaces" (ANSI Z117.1), or equivalent training</p> |
| <input type="checkbox"/> | <p>(6) Ladders: Workers that may be performing work on ladders are instructed to adhere to the following:</p> <ul style="list-style-type: none">▪ Inspect before using▪ Place ladder using 4 to 1 rule▪ Never place base of ladder on objects▪ Never place ladder in front of door unless▪ Door is blocked in open position▪ Door is demarcated off▪ Door is locked |
| <input type="checkbox"/> | <p>(7) Scaffolding: For work that requires scaffolding use for employees and subcontractors, personal fall protection shall be mandatory, unless working less than 6 ft. The following topics listed will be conveyed to workers prior to scaffolding use</p> <ul style="list-style-type: none">▪ Review scaffolding supplier pamphlet for proper construction▪ Inspect scaffolding structure before initial use/and daily▪ Report any defects immediately / do not use / tag out of service |

Safety Requirements

Site Specific Accident Prevention Plan - Sample

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| | <ul style="list-style-type: none"> ▪ Placement of structure ▪ When fall protection is required ▪ What you can tie off to |
| <input type="checkbox"/> | (8) Work platforms: Describe type of platform required and specific requirements for its use. |
| <input type="checkbox"/> | (9) Fall protection: Personal Fall Protection <Name> Construction Company requires all employees working at or above 6' to wear personal fall protection, unless the personal fall protection creates a safety hazard by utilizing it. In that case, other means of fall protection shall be provided. |
| <input type="checkbox"/> | (10) Asbestos: As part of the Asbestos program, <Name> Construction Company will inform subcontractors, or their representatives of the site emergency response procedures and any potential fire, explosion, health, safety, or other hazards. The substances listed in Section 13, paragraph c, under MSDS, have the potential to be released or spilled. Section 13.c, Hazard Communication, lists some potential hazards that contractors and/or subcontractors may encounter. Also listed are the response actions to be taken and the proper notification. |
| <input type="checkbox"/> | (11) Hazardous materials: The substances listed in Section 13 paragraph c, under MSDS, have the potential to be released or spilled. Section 13 c, Hazard Communication, lists some potential hazards that contractors and/or subcontractors may encounter. Also listed are the response actions to be taken and the proper notification. MSDS sheets must be made available for review by the VAMC and contracted employees. |
| <input type="checkbox"/> | (12) Hot work: The <Name> Construction Company will follow VAMC Cleveland's Hot work Policy (MCP 138-012), <Name> Construction will submit a Hot Work Permit to the COR to perform acetylene oxygen welding, brazing and cutting, the following |

Safety Requirements

Site Specific Accident Prevention Plan - Sample

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| | <p>precautionary measures will be required.</p> <ul style="list-style-type: none"> ▪ Inspect all surroundings and equipment to insure that combustible substances are not present in any area where contact of metal at a temperature above the flashpoint of any compound is possible. ▪ Ensure that no open containers or spills of combustible substances are present. ▪ Ensure that ignition is not possible by conduction, convection, radiation, or dispersion of molten metal. ▪ Proper protection equipment and practices will be used, i.e., fireproof blankets, removal of combustible materials where practicable, and portable fire extinguishers of proper type on hand. ▪ When the above operations are in use a continuous Fire Watch will be performed while equipment is being used. ▪ Training in fire protection will occur at the site safety orientation. |
| <input type="checkbox"/> | <p>(13) Ventilation: <Describe the type of forced ventilation that will be used and the reason it is required. Example: A 500 CFM Red Devil blower will be set up for welding operations in the sub-basement. The exhaust of this blower will be directed to the outside.></p> |
| <input type="checkbox"/> | <p>(14) Power distribution: Describe the circumstances that would make it necessary for disruption of power from the main power lines or associated transformers entering the facility.</p> |
| <input type="checkbox"/> | <p>(15) Work being done on energized equipment: Any work to be done on Energized Equipment must be done in accordance with Medical Center Policy (MCP) 138 – 03 (Working on Energized Equipment). The Medical Centers Directors permission is required to work any circuit energized. A Energized Circuit Work permit must be approved before starting work.</p> |

Safety Requirements

Site Specific Accident Prevention Plan - Sample

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| <input type="checkbox"/> | (16) Other electric: List Specifics |
| <input type="checkbox"/> | <p>(17) Loto:</p> <ul style="list-style-type: none"> Only VA Employees will manipulate breakers or valves to perform a Lock Out Tag unless specific permission (in writing) is obtained by the Assistant Chief Engineering, M&O. The VA will hang Locks or tags on valves or breakers as requested by the project manager. After the VA places their lock on the device, then <Name> Construction Company will be allowed to place their lock on the device. When clearing the Lock Out Tag Out, <Name> Construction. Company will remove <Name> Construction's locks and notify the COR. The VA will then remove the VA locks and reposition the valve or breaker at the request of <Name> Construction Company. |
| <input type="checkbox"/> | <p>(18) Crane operation: <(Example) There will be X critical lifts required on this project. A crane will be utilized to load new materials onto Xth floor roof and remove demolished material from the roof. A plan will be submitted and approved prior to this work being performed.></p> |
| <input type="checkbox"/> | <p>(19) Excavating; Trenches, ditches – Describe the type, name of competent person, trench boxes required and if necessary air sampling requirements.</p> |
| <input type="checkbox"/> | <p>(20) Earthmoving: (Example) The use of this equipment will be required on this project for moving of earth. Safety will be the responsibility of the company performing the work.</p> |
| <input type="checkbox"/> | <p>(21) Industrial trucks: (Example) The use of this equipment will be required on this</p> |

Safety Requirements

Site Specific Accident Prevention Plan - Sample

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| | project for loading materials onto the X th floor roof. Industrial truck safety will be the responsibility of the company performing the work. |
| <input type="checkbox"/> | (22) Other motorized equipment: List type and specific use. Only qualified operators will be allowed to operate motorized equipment. Diesel powered equipment will not be used near medical Center Ventilation Intakes. |
| <input type="checkbox"/> | (23) Concrete, Masonry operations: Describe the work to be performed and what fall protection will be provided for workers on forms that are higher than six feet. |
| <input type="checkbox"/> | (24) Steel Erection: Describe the type of steel erection, fire protection coatings used and fall protection requirements if not already addressed in (10) Fall Protection. |
| <input type="checkbox"/> | (25) Alteration or Improvement of existing Electrical transmission and distribution lines and equipment. – Describe the scope of work and provisions made to ensure that the facility does not lose power during the work. |
| <input type="checkbox"/> | <p>(26) Hand & portable tools</p> <p>a) Hand Tools</p> <p>.1 For your own protection, do not misuse your tools. Use tools only for the purpose for which they were designed.</p> <p>.2 Your job will be easier and much safer if tools are in good condition. Take care in handling and storing tools.</p> <p>.3 You and the person in charge must be satisfied that all the tools you use on the job, whether they are Company- or personally-owned, are in safe condition.</p> |

Safety Requirements

Site Specific Accident Prevention Plan - Sample

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| | <ul style="list-style-type: none">.4 Tools with mushroomed heads, loose, split or broken handles, broken screw drivers, defective pliers, wrenches with spread jaws, defective cords, ground wires and plugs, etc., must not be used..5 Never use a defective tool. Defective tools are to be removed from service and marked defective..6 For your own protection, do not misuse your tools..7 Cover sharp-edged and pointed tools with scabbards and guards. Always use the guards when the tools are not in use..8 Never strike the hardened part of one tool against the hardened part of another tool or against any hardened surface..9 Never use a file with a tang unless it is equipped with a handle..10 Never throw tools from one person to another or from one level to another..11 Hot tools, equipment or materials on tables or benches, even if they are metal covered, shall be properly identified..12 Never use improper handles when you work with jacks. Always remove handles when they are not being used..13 Never use metal-shielded spotlights or flashlights around exposed electrical equipment. <p>b) Extension Cords</p> <ul style="list-style-type: none">.1 Use only approved extension cords and lamp guards. Extension cord lamps used in explosion-hazard atmospheres, such as oil vapor or flammable gases, must be equipped with guards and vapor-proof globes. Do not use a lamp with a switch..2 When you use an extension cord around switchboards, switch structures or electrical equipment, it must have a non-metallic socket and guard..3 Use only specially approved low voltage (6 or 12 Volt) extension cords or |
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Safety Requirements

Site Specific Accident Prevention Plan - Sample

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| | <p>ground fault circuit interrupter (GFCI) when you need portable lighting in wet locations. This type of cord should be used when you work outdoors, in tanks or in other areas where moisture or condensation may be a hazard.</p> <p>.4 Use GFCI protected circuits where required by the electric code. If there is a question about the requirements, contact Engineering Service for resolution.</p> <p>c) Tool Containers</p> <p>.1 Cover any grating to prevent your tools or material from falling. When you are working on scaffolds or platforms, use a suitable container for any of your tools that are not actually being used.</p> <p>d) Power Tools</p> <p>.1 Always wear the proper personal protective equipment including but not limited to eye protection.</p> <p>.2 Before you use any power tool, check to make sure:</p> <ul style="list-style-type: none">• .it is properly tested;• all guards are in place;• all material is properly secured;• you disconnect the tool electrically before inserting or removing any attachments; and• you use GFCI protected circuits when required. <p>.3 While a machine is in operation:</p> <ul style="list-style-type: none">• never remove chips with your hand; always use a suitable brush, hook |
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Safety Requirements

Site Specific Accident Prevention Plan - Sample

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| | <p>or stick;</p> <ul style="list-style-type: none">• do not let the machine run unattended;• do not place tools or materials on machines where they can be jarred or pushed off;• never try to stop a machine using your hands or any other part of your body as a brake; and• both hands shall be used when working with portable tools. <p>.4 You must unplug power tools when they are left unattended. You must shut off and de-pressurize (bleed down) pneumatic- or hydraulic-operated tools when they are left unattended.</p> <p>.5 Keep the floor around machines clean and free from oil. If you spill any oil, wipe it up immediately or use an oil absorbent. Slipping is one of the most common causes of accidents.</p> <p>.6 Carefully inspect grinding machines before you use them. Be sure that:</p> <ul style="list-style-type: none">• you perform a ring test prior to installing a new wheel;• the wheel is secure on the driving shaft;• the wheel is in good condition; dress or replace the wheel as necessary;• the work rest is adjusted properly; and• the safety guard is in place and allows proper visibility to do the work.• Do not use the side of the wheel for grinding, unless it is specifically designed for side grinding.• Many wheels cannot stand up under side grinding.• Never drive a grinding wheel at speeds above that specified by the manufacturer.• When you grind small objects, hold them firmly in place with a suitable tool, not with your fingers. |
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Safety Requirements

Site Specific Accident Prevention Plan - Sample

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| | <ul style="list-style-type: none"> Do not grind soft metals such as aluminum |
| <input type="checkbox"/> | <p>(27) Compressed Gasses: Compressed gas cylinders may be used at this worksite. These cylinders and gases present an injury hazard in the event that a regulator or cylinder is damaged and/or broken. The particular gases used will be <Name Gas>. These hazards will be reduced by routine inspections and maintenance of compressed gas cylinders and by assuring all the units are secured from tipping. Safety caps will be installed on all cylinders that are not in use.</p> <p>Compressed gas cylinder will be kept away from excessive heat, will not be stored where they might be damaged or knocked over by passing or falling objects. The storage of oxygen and fuel gas compressed cylinders will be separated by at least 20 ft.</p> |
| <input type="checkbox"/> | <p>(28) Other hazardous activities <(Name and describe safety precautions)></p> |
| <input type="checkbox"/> | <p>(29) Infection Control : Infection Control (216-791-3800 Ext 4791) has been contacted for work in patient care or high risk areas to conduct an Infection Control Risk Assessment (ICRA). Provisions of the ICRA will be followed unless changed by Infection Control.</p> |
| <input type="checkbox"/> | <p>(30) Life Safety: Occupational Health and Safety 216-791-3800 Ext 4172 has been contacted to conduct a Life Safety Risk Assessment. Interim Life Safety measures have been determined and will be posted outside of the construction area. Fire extinguishers will be provided inside the construction area and they will be inspected at a minimum of 30 day intervals. Provisions of the Interim Life Safety measures will be followed unless modified by Occupational Health and Safety. If penetrations are made in smoke/fire barriers the COR will verify that they have been appropriately sealed before project completion.</p> |
| <input type="checkbox"/> | <p>(31) Emergency Procedures: Standard Emergency Response Plan is described in section 7. Additional provisions required for rescuing employees working at heights or working in Permit Required Confined Spaces will be as follows: <Describe Specifics></p> |

Safety Requirements

Site Specific Accident Prevention Plan - Sample

| | | |
|--------------------------|------|--|
| <input type="checkbox"/> | (32) | Demolition: Demolition is described in the Scope of Work Summary. Collection of demolition debris for recycling will minimize dust generation. All containers will be covered and employees will use appropriate methods for controlling the spread of dust outside the construction zone. |
| <input type="checkbox"/> | (33) | New Construction Recycling: A minimum of <X%> of total project waste will be diverted to a landfill. a) Concrete b) Steel |
| <input type="checkbox"/> | (34) | Interior Remodeling Recycling: A minimum of <X%> of total project waste will be diverted to a landfill. a) Ceiling Tile b) Steel c) Carpet |
| <input type="checkbox"/> | (35) | General Recycling: The following categories of waste shall be diverted from a landfill (Check all that apply): |
| <input type="checkbox"/> | | Green Waste (Biodegradable landscaping material) |
| <input type="checkbox"/> | | Soil |
| <input type="checkbox"/> | | Inserts (concrete, asphalt, masonry) |
| <input type="checkbox"/> | | Clean dimensional wood, palette wood |
| <input type="checkbox"/> | | Engineered wood products, plywood, particle board, I joints, etc. |
| <input type="checkbox"/> | | Cardboard Paper packaging |
| <input type="checkbox"/> | | Asphalt Roofing materials |
| <input type="checkbox"/> | | Insulation |

Safety Requirements

Site Specific Accident Prevention Plan - Sample

BID ISSUE
04/24/2015

VAMC WADE PARK
PROVIDE SMOKE SHELTER
PROJECT #:541-17-212

| | | |
|--|--------------------------|---------------------|
| | <input type="checkbox"/> | Gypsum board |
| | <input type="checkbox"/> | Carpet and pad |
| | <input type="checkbox"/> | Paint |
| | <input type="checkbox"/> | Plastics: ABX, PVC |
| | <input type="checkbox"/> | Beverage containers |

Safety Requirements

Site Specific Accident Prevention Plan - Sample

APPENDIX A

Evacuation Routes Work Zone Layouts and Maps to Emergency Services

Contractor and subcontractors working in the Medical Center will follow the posted exit signs and maps to evacuate the medical Center. To ensure all employees have been evacuated, they will meet at [**<Location>**](#).

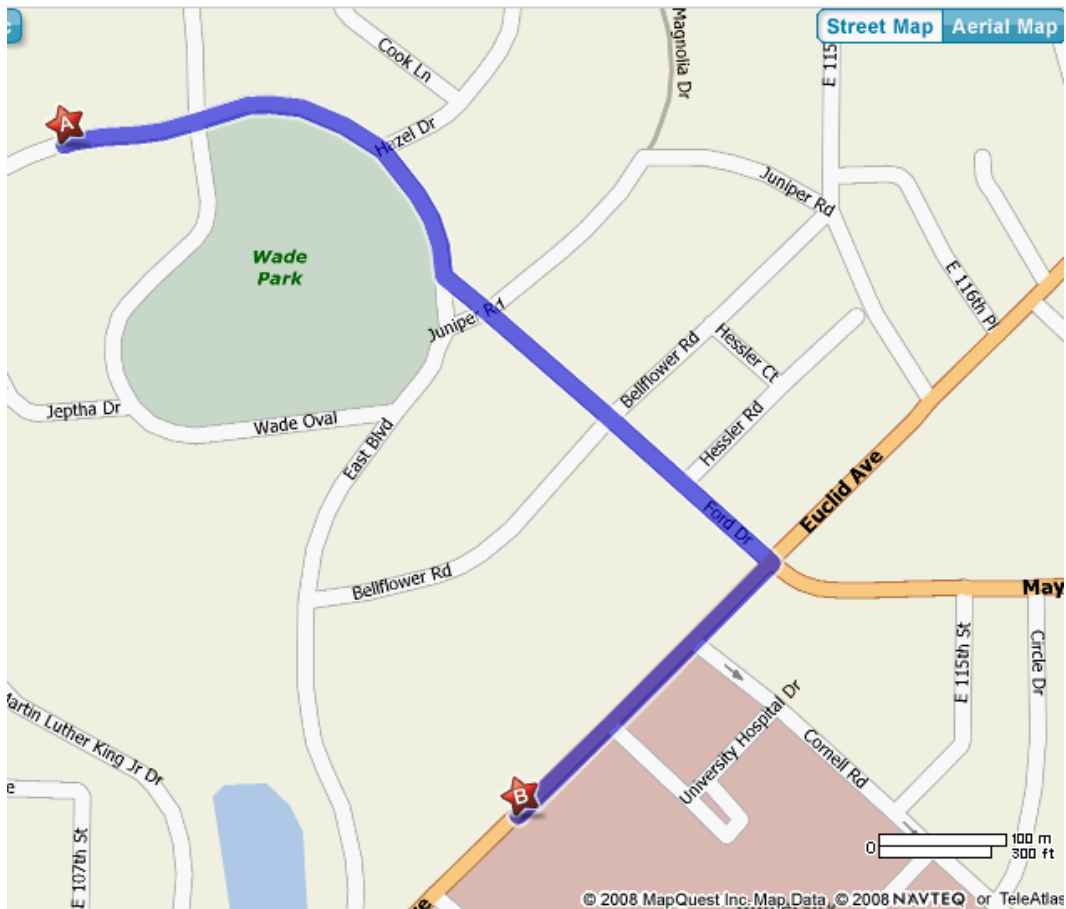
Map from VAMC Cleveland (Wade Park Division) to University Hospital

Safety Requirements

Site Specific Accident Prevention Plan - Sample

BID ISSUE
04/24/2015

VAMC WADE PARK
PROVIDE SMOKE SHELTER
PROJECT #:541-17-212



Safety Requirements

Site Specific Accident Prevention Plan - Sample

APPENDIX B

CERTIFICATIONS & JOBSITE DOCUMENTATION PROGRAM

<List all individuals including their titles, who have completed

1. **OSHA 30 Hour Construction Safety Course**
2. **OSHA 10 Hour construction Safety Course**
3. **Competent Person Certifications for Respiratory Protection, Fall Protection, Trenching and Shoring, etc. as required by the Scope of Work and applicable regulations.>**

Safety Requirements

Site Specific Accident Prevention Plan - Sample

BID ISSUE
04/24/2015

VAMC WADE PARK
PROVIDE SMOKE SHELTER
PROJECT #:541-17-212

APPENDIX C

CONTRACTOR ACCIDENT RECORD

OSHA 300 FORM

<To be updated and maintained in the on site construction office or the
service company if an office is not located on station.>

Safety Requirements

Site Specific Accident Prevention Plan - Sample

SECTION 01 35 26

SAFETY REQUIREMENTS

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS:

- A. Latest publications listed below form part of this Article to extent referenced. Publications are referenced in text by basic designations only.
- B. American Society of Safety Engineers (ASSE):
 - 1. A10.1-2011 Pre-Project & Pre-Task Safety and Health Planning
 - 2. A10.34-2012 Protection of the Public on or Adjacent to Construction Sites
 - 3. A10.38-2013 Basic Elements of an Employer's Program to Provide a Safe and Healthful Work Environment American National Standard Construction and Demolition Operations
- C. American Society for Testing and Materials (ASTM):
 - 1. E84-2013 Surface Burning Characteristics of Building Materials
- D. The Facilities Guidelines Institute (FGI):
 - 1. FGI Guidelines-2010Guidelines for Design and Construction of Healthcare Facilities
- E. National Fire Protection Association (NFPA):
 - 1. 10-2013 Standard for Portable Fire Extinguishers
 - 2. 30-2012 Flammable and Combustible Liquids Code
 - 3. 51B-2014 Standard for Fire Prevention During Welding, Cutting and Other Hot Work
 - 4. 70-2014 National Electrical Code
 - 5. 70B-2013 Recommended Practice for Electrical Equipment Maintenance
 - 6. 70E-2012 Standard for Electrical Safety in the Workplace
 - 7. 99-2012 Health Care Facilities Code
 - 8. 241-2013 Standard for Safeguarding Construction, Alteration, and Demolition Operations
- F. The Joint Commission (TJC):
 - 1. TJC Manual Comprehensive Accreditation and Certification Manual
- G. U.S. Nuclear Regulatory Commission:
 - 1. 10 CFR 20 Standards for Protection Against Radiation
- H. U.S. Occupational Safety and Health Administration (OSHA):
 - 1. 29 CFR 1904 Reporting and Recording Injuries & Illnesses

2. 29 CFR 1910 Safety and Health Regulations for General Industry
3. 29 CFR 1926 Safety and Health Regulations for Construction Industry
4. CPL 2-0.124 Multi-Employer Citation Policy

I. VHA Directive 2005-007

1.2 DEFINITIONS:

- A. OSHA "Competent Person" (CP). One who is capable of identifying existing and predictable hazards in the surroundings and working conditions which are unsanitary, hazardous or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them (see 29 CFR 1926.32(f)).
- B. "Qualified Person" means one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work, or the project.
- C. High Visibility Accident. Any mishap which may generate publicity or high visibility.
- D. Medical Treatment. Treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment even though provided by a physician or registered personnel.
- E. Recordable Injuries or Illnesses. Any work-related injury or illness that results in:
 1. Death, regardless of the time between the injury and death, or the length of the illness;
 2. Days away from work (any time lost after day of injury/illness onset);
 3. Restricted work;
 4. Transfer to another job;
 5. Medical treatment beyond first aid;
 6. Loss of consciousness; or
 7. A significant injury or illness diagnosed by a physician or other licensed health care professional, even if it did not result in (1) through (6) above.

1.3 REGULATORY REQUIREMENTS:

- A. In addition to the detailed requirements included in the provisions of this contract, comply with 29 CFR 1926, comply with 29 CFR 1910 as incorporated by reference within 29 CFR 1926, comply with ASSE A10.34, and all applicable federal, state, and local laws, ordinances, criteria, rules and regulations. Submit matters of interpretation of standards for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements govern except with specific approval and acceptance by the or Contracting Officer Representative w.

1.4 ACCIDENT PREVENTION PLAN (APP):

- A. The APP (aka Construction Safety & Health Plan) shall interface with the Contractor's overall safety and health program. Include any portions of the Contractor's overall safety and health program referenced in the APP in the applicable APP element and ensure it is site-specific. The Government considers the Prime Contractor to be the "controlling authority" for all worksite safety and health of each subcontractor(s). Contractors are responsible for informing their subcontractors of the safety provisions under the terms of the contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out.
- B. The APP shall be prepared as follows:
1. Written in English by a qualified person who is employed by the Prime Contractor articulating the specific work and hazards pertaining to the contract (model language can be found in ASSE A10.33). Specifically articulating the safety requirements found within these VA contract safety specifications.
 2. Address both the Prime Contractors and the subcontractors work operations.
 3. State measures to be taken to control hazards associated with materials, services, or equipment provided by suppliers.
 4. Address all the elements/sub-elements and in order as follows:
 - a. SIGNATURE SHEET. Title, signature, and phone number of the following:
 - 1) Plan preparer (Qualified Person such as corporate safety staff person or contracted Certified Safety Professional with construction safety experience);
 - 2) Plan approver (company/corporate officers authorized to obligate the company);
 - 3) Plan concurrence (e.g., Chief of Operations, Corporate Chief of Safety, Corporate Industrial Hygienist, project manager or superintendent, project safety professional). Provide concurrence of other applicable corporate and project personnel (Contractor).

- b. BACKGROUND INFORMATION. List the following:
 - 1) Contractor;
 - 2) Contract number;
 - 3) Project name;
 - 4) Brief project description, description of work to be performed, and location; phases of work anticipated (these will require an AHA).
- c. STATEMENT OF SAFETY AND HEALTH POLICY. Provide a copy of current corporate/company Safety and Health Policy Statement, detailing commitment to providing a safe and healthful workplace for all employees. The Contractor's written safety program goals, objectives, and accident experience goals for this contract should be provided.
- d. RESPONSIBILITIES AND LINES OF AUTHORITIES. Provide the following:
 - 1) A statement of the employer's ultimate responsibility for the implementation of his SOH program;
 - 2) Identification and accountability of personnel responsible for safety at both corporate and project level. Contracts specifically requiring safety or industrial hygiene personnel shall include a copy of their resumes.
 - 3) The names of Competent and/or Qualified Person(s) and proof of competency/qualification to meet specific OSHA Competent/Qualified Person(s) requirements must be attached.
 - 4) Requirements that no work shall be performed unless a designated competent person is present on the job site;
 - 5) Requirements for pre-task Activity Hazard Analysis (AHAs);
 - 6) Lines of authority;
 - 7) Policies and procedures regarding noncompliance with safety requirements (to include disciplinary actions for violation of safety requirements) should be identified;
- e. SUBCONTRACTORS AND SUPPLIERS. If applicable, provide procedures for coordinating SOH activities with other employers on the job site:
 - 1) Identification of subcontractors and suppliers (if known);
 - 2) Safety responsibilities of subcontractors and suppliers.
- f. TRAINING.
 - 1) Site-specific SOH orientation training at the time of initial hire or assignment to the project for every employee before working on the project site is required.

- 2) Mandatory training and certifications that are applicable to this project (e.g., explosive actuated tools, crane operator, rigger, crane signal person, fall protection, electrical lockout/NFPA 70E, machine/equipment lockout, confined space, etc.) and any requirements for periodic retraining/recertification are required.
 - 3) Procedures for ongoing safety and health training for supervisors and employees shall be established to address changes in site hazards/conditions.
 - 4) OSHA 10-hour training is required for all workers on site and the OSHA 30-hour training is required for Trade Competent Persons (CPs)
- g. SAFETY AND HEALTH INSPECTIONS.
- 1) Specific assignment of responsibilities for a minimum daily job site safety and health inspection during periods of work activity: Who will conduct (e.g., "Site Safety and Health CP"), proof of inspector's training/qualifications, when inspections will be conducted, procedures for documentation, deficiency tracking system, and follow-up procedures.
 - 2) Any external inspections/certifications that may be required (e.g., contracted CSP or CSHT)
- h. ACCIDENT INVESTIGATION & REPORTING. The Contractor shall conduct mishap investigations of all OSHA Recordable Incidents. The APP shall include accident/incident investigation procedure & identify person(s) responsible to provide the following to the or Contracting Officer Representative or Government Designated Authority:
- 1) Exposure data (man-hours worked);
 - 2) Accident investigations, reports, and logs.
- i. PLANS (PROGRAMS, PROCEDURES) REQUIRED. Based on a risk assessment of contracted activities and on mandatory OSHA compliance programs, the Contractor shall address all applicable occupational risks in site-specific compliance and accident prevention plans. These Plans shall include but are not be limited to procedures for addressing the risks associates with the following:
- 1) Emergency response ;
 - 2) Contingency for severe weather;
 - 3) Fire Prevention ;
 - 4) Medical Support;
 - 5) Posting of emergency telephone numbers;
 - 6) Prevention of alcohol and drug abuse;
 - 7) Site sanitation (housekeeping, drinking water, toilets);
 - 8) Night operations and lighting ;

- 9) Hazard communication program;
 - 10) Welding/Cutting "Hot" work ;
 - 11) Electrical Safe Work Practices (Electrical LOTO/NFPA 70E);
 - 12) General Electrical Safety
 - 13) Hazardous energy control (Machine LOTO);
 - 14) Site-Specific Fall Protection & Prevention;
 - 15) Excavation/trenching;
 - 16) Asbestos abatement;
 - 17) Lead abatement;
 - 18) Crane Critical lift;
 - 19) Respiratory protection;
 - 20) Health hazard control program;
 - 21) Radiation Safety Program;
 - 22) Abrasive blasting;
 - 23) Heat/Cold Stress Monitoring;
 - 24) Crystalline Silica Monitoring (Assessment);
 - 25) Demolition plan (to include engineering survey);
 - 26) Formwork and shoring erection and removal;
 - 27) PreCast Concrete.
- C. Submit the APP to the COR for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES 14 calendar days prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted APP.
- D. Once accepted by the COR, the APP and attachments will be enforced as part of the contract. Disregarding the provisions of this contract or the accepted APP will be cause for stopping of work, at the discretion of the Contracting Officer, until the matter has been rectified.
- E. Once work begins, changes to the accepted APP shall be made with the knowledge and concurrence of the COR. Should any severe hazard exposure, i.e. imminent danger, become evident, stop work in the area, secure the area, and develop a plan to remove the exposure and control the hazard. Notify the Contracting Officer within 24 hours of discovery. Eliminate/remove the hazard. In the interim, take all necessary action to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public (as defined by ASSE/SAFE A10.34) and the environment.

1.5 ACTIVITY HAZARD ANALYSES (AHAs):

- A. AHAs are also known as Job Hazard Analyses, Job Safety Analyses, and Activity Safety Analyses. Before beginning each work activity involving a type of work presenting hazards not experienced in previous project operations or where a new work crew or sub-contractor is to perform the work, the Contractor(s) performing that work activity shall prepare an AHA (Example electronic AHA forms can be found on the US Army Corps of Engineers web site)
- B. AHAs shall define the activities being performed and identify the work sequences, the specific anticipated hazards, site conditions, equipment, materials, and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level of risk.
- C. Work shall not begin until the AHA for the work activity has been accepted by the COR and discussed with all engaged in the activity, including the Contractor, subcontractor(s), and Government on-site representatives at preparatory and initial control phase meetings.
 - 1. The names of the Competent/Qualified Person(s) required for a particular activity (for example, excavations, scaffolding, fall protection, other activities as specified by OSHA and/or other State and Local agencies) shall be identified and included in the AHA. Certification of their competency/qualification shall be submitted to the Government Designated Authority (GDA) for acceptance prior to the start of that work activity.
 - 2. The AHA shall be reviewed and modified as necessary to address changing site conditions, operations, or change of competent/qualified person(s).
 - a. If more than one Competent/Qualified Person is used on the AHA activity, a list of names shall be submitted as an attachment to the AHA. Those listed must be Competent/Qualified for the type of work involved in the AHA and familiar with current site safety issues.
 - b. If a new Competent/Qualified Person (not on the original list) is added, the list shall be updated (an administrative action not requiring an updated AHA). The new person shall acknowledge in writing that he or she has reviewed the AHA and is familiar with current site safety issues.
 - 3. Submit AHAs to the COR for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES for review at least 15 [__] calendar days prior to the start of each phase. Subsequent AHAs as shall be formatted as amendments to the APP. The analysis should be used during daily inspections to ensure the implementation and effectiveness of the activity's safety and health controls.
 - 4. The AHA list will be reviewed periodically (at least monthly) at the Contractor supervisory safety meeting and updated as necessary when procedures, scheduling, or hazards change.

5. Develop the activity hazard analyses using the project schedule as the basis for the activities performed. All activities listed on the project schedule will require an AHA. The AHAs will be developed by the contractor, supplier, or subcontractor and provided to the prime contractor for review and approval and then submitted to the COR or Government Designated Authority.

1.6 PRECONSTRUCTION CONFERENCE:

- A. Contractor representatives who have a responsibility or significant role in implementation of the accident prevention program, as required by 29 CFR 1926.20(b)(1), on the project shall attend the preconstruction conference to gain a mutual understanding of its implementation. This includes the project superintendent, subcontractor superintendents, and any other assigned safety and health professionals.
- B. Discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that will be developed and implemented during the performance of the contract. This list of proposed AHAs will be reviewed at the conference and an agreement will be reached between the Contractor and the Contracting Officer's representative as to which phases will require an analysis. In addition, establish a schedule for the preparation, submittal, review, and acceptance of AHAs to preclude project delays.
- C. Deficiencies in the submitted APP will be brought to the attention of the Contractor within 14 days of submittal, and the Contractor shall revise the plan to correct deficiencies and re-submit it for acceptance. Do not begin work until there is an accepted APP.

1.7 "SITE SAFETY AND HEALTH OFFICER" (SSHO) AND "COMPETENT PERSON" (CP):

- A. The Prime Contractor shall designate a minimum of one SSHO at each project site that will be identified as the SSHO to administer the Contractor's safety program and government-accepted Accident Prevention Plan. Each subcontractor shall designate a minimum of one CP in compliance with 29 CFR 1926.20 (b)(2) that will be identified as a CP to administer their individual safety programs.
- B. Further, all specialized Competent Persons for the work crews will be supplied by the respective contractor as required by 29 CFR 1926 (i.e. Asbestos, Electrical, Cranes, & Derricks, Demolition, Fall Protection, Fire Safety/Life Safety, Ladder, Rigging, Scaffolds, and Trenches/Excavations).
- C. These Competent Persons can have collateral duties as the subcontractor's superintendent and/or work crew lead persons as well as fill more than one specialized CP role (i.e. Asbestos, Electrical, Cranes, & Derricks, Demolition, Fall Protection, Fire Safety/Life Safety, Ladder, Rigging, Scaffolds, and Trenches/Excavations).

- D. The SSHO or an equally-qualified Designated Representative/alternate will maintain a presence on the site during construction operations in accordance with FAR Clause 52.236-6: *Superintendence by the Contractor*. CPs will maintain presence during their construction activities in accordance with above mentioned clause. A listing of the designated SSHO and all known CPs shall be submitted prior to the start of work as part of the APP with the training documentation and/or AHA as listed in Section 1.8 below.
- E. The repeated presence of uncontrolled hazards during a contractor's work operations will result in the designated CP as being deemed incompetent and result in the required removal of the employee in accordance with FAR Clause 52.236-5: Material and Workmanship, Paragraph (c).

1.8 TRAINING:

- A. The designated Prime Contractor SSHO must meet the requirements of all applicable OSHA standards and be capable (through training, experience, and qualifications) of ensuring that the requirements of 29 CFR 1926.16 and other appropriate Federal, State and local requirements are met for the project. As a minimum the SSHO must have completed the OSHA 30-hour Construction Safety class and have five (5) years of construction industry safety experience or three (3) years if he/she possesses a Certified Safety Professional (CSP) or certified Construction Safety and Health Technician (CSHT) certification or have a safety and health degree from an accredited university or college.
- B. All designated CPs shall have completed the OSHA 30-hour Construction Safety course within the past 5 years.
- C. In addition to the OSHA 30 Hour Construction Safety Course, all CPs with high hazard work operations such as operations involving asbestos, electrical, cranes, demolition, work at heights/fall protection, fire safety/life safety, ladder, rigging, scaffolds, and trenches/excavations shall have a specialized formal course in the hazard recognition & control associated with those high hazard work operations. Documented "repeat" deficiencies in the execution of safety requirements will require retaking the requisite formal course.
- D. All other construction workers shall have the OSHA 10-hour Construction Safety Outreach course and any necessary safety training to be able to identify hazards within their work environment.
- E. Submit training records associated with the above training requirements to the COR for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES 15 14 calendar days prior to the date of the preconstruction conference for acceptance.

- F. Prior to any worker for the contractor or subcontractors beginning work, they shall undergo a safety briefing provided by the SSHO or his/her designated representative. As a minimum, this briefing shall include information on the site-specific hazards, construction limits, VAMC safety guidelines, means of egress, break areas, work hours, locations of restrooms, use of VAMC equipment, emergency procedures, accident reporting etc... Documentation shall be provided to the COR that individuals have undergone contractor's safety briefing.
- G. Ongoing safety training will be accomplished in the form of weekly documented safety meeting.

1.9 INSPECTIONS:

- A. The SSHO shall conduct frequent and regular safety inspections (daily) of the site and each of the subcontractors CPs shall conduct frequent and regular safety inspections (daily) of the their work operations as required by 29 CFR 1926.20(b)(2). Each week, the SSHO shall conduct a formal documented inspection of the entire construction areas with the subcontractors' "Trade Safety and Health CPs" present in their work areas. Coordinate with, and report findings and corrective actions weekly to [COR.
- B. A Certified Safety Professional (CSP) with specialized knowledge in construction safety or a certified Construction Safety and Health Technician (CSHT) shall randomly conduct a monthly site safety inspection. The CSP or CSHT can be a corporate safety professional or independently contracted. The CSP or CSHT will provide their certificate number on the required report for verification as necessary.
 - 1. Results of the inspection will be documented with tracking of the identified hazards to abatement.
 - 2. The COR will be notified immediately prior to start of the inspection and invited to accompany the inspection.
 - 3. Identified hazard and controls will be discussed to come to a mutual understanding to ensure abatement and prevent future reoccurrence.
 - 4. A report of the inspection findings with status of abatement will be provided to the COR within one week of the onsite inspection.

1.10 ACCIDENTS, OSHA 300 LOGS, AND MAN-HOURS:

- A. Notify the COR as soon as practical, but no more than four hours after any accident meeting the definition of OSHA Recordable Injuries or Illnesses or High Visibility Accidents, property damage equal to or greater than \$5,000, or any weight handling equipment accident. Within notification include contractor name; contract title; type of contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (to include type of construction equipment used, PPE used, etc.). Preserve the conditions and evidence on the accident site until the COR determine whether a government investigation will be conducted.

- B. Conduct an accident investigation for recordable injuries and illnesses, for Medical Treatment defined in paragraph DEFINITIONS, and property damage accidents resulting in at least \$20,000 in damages, to establish the root cause(s) of the accident. Complete the VA Form 2162, and provide the report to the COR within 5 calendar days of the accident. The COR will provide copies of any required or special forms.
- C. A summation of all man-hours worked by the contractor and associated sub-contractors for each month will be reported to the COR monthly.
- D. A summation of all OSHA recordable accidents experienced on site by the contractor and associated sub-contractors for each month will be provided to the COR monthly. The contractor and associated sub-contractors' OSHA 300 logs will be made available to the COR as requested.

1.11 PERSONAL PROTECTIVE EQUIPMENT (PPE):

- A. PPE is governed in all areas by the nature of the work the employee is performing. For example, specific PPE required for performing work on electrical equipment is identified in NFPA 70E, Standard for Electrical Safety in the Workplace.
- B. Mandatory PPE includes:
 - 1. Hard Hats - unless written authorization is given by the COR in circumstances of work operations that have limited potential for falling object hazards such as during finishing work or minor remodeling. With authorization to relax the requirement of hard hats, if a worker becomes exposed to an overhead falling object hazard, then hard hats would be required in accordance with the OSHA regulations.
 - 2. Safety glasses - unless written authorization is given by the COR appropriate safety glasses meeting the ANSI Z.87.1 standard must be worn by each person on site.
 - 3. Appropriate Safety Shoes - based on the hazards present, safety shoes meeting the requirements of ASTM F2413-11 shall be worn by each person on site unless written authorization is given by the COR.
 - 4. Hearing protection - Use personal hearing protection at all times in designated noise hazardous areas or when performing noise hazardous tasks.

1.12 INFECTION CONTROL

- A. Infection Control is critical in all medical center facilities. Interior construction activities causing disturbance of existing dust, or creating new dust, must be conducted within ventilation-controlled areas that minimize the flow of airborne particles into patient areas. Exterior construction activities causing disturbance of soil or creates dust in some other manner must be controlled.

BID ISSUE
04/24/2015

VAMC WADE PARK
PROVIDE SMOKE SHELTER
PROJECT #:541-17-212

B. An AHA associated with infection control will be performed by VA personnel in accordance with FGI Guidelines (i.e. Infection Control Risk Assessment (ICRA)). The ICRA procedure found on the American Society for Healthcare Engineering (ASHE) website will be utilized. Risk classifications of Class II or lower will require approval by the COR before beginning any construction work. Risk classifications of Class III or higher will require a permit before beginning any construction work. Infection Control permits will be issued by the COR. The Infection Control Permits will be posted outside the appropriate construction area. More than one permit may be issued for a construction project if the work is located in separate areas requiring separate classes.

1. Class I requirements:

a. During Construction Work:

- 1) Notify the COR
- 2) Execute work by methods to minimize raising dust from construction operations.
- 3) Ceiling tiles: Immediately replace a ceiling tiles displaced for visual inspection.

b. Upon Completion:

- 1) Clean work area upon completion of task
- 2) Notify the COR

2. Class II requirements:

a. During Construction Work:

- 1) Notify the COR
- 2) Provide active means to prevent airborne dust from dispersing into atmosphere such as wet methods or tool mounted dust collectors where possible.
- 3) Water mist work surfaces to control dust while cutting.
- 4) Seal unused doors with duct tape.
- 5) Block off and seal air vents.
- 6) Remove or isolate HVAC system in areas where work is being performed.

b. Upon Completion:

- 1) Wipe work surfaces with cleaner/disinfectant.
- 2) Contain construction waste before transport in tightly covered containers.
- 3) Wet mop and/or vacuum with HEPA filtered vacuum before leaving work area.
- 4) Upon completion, restore HVAC system where work was performed
- 5) Notify the COR

3. Class III requirements:

a. During Construction Work:

- 1) Obtain permit from the COR
- 2) Remove or Isolate HVAC system in area where work is being done to prevent contamination of duct system.
- 3) Complete all critical barriers i.e. sheetrock, plywood, plastic, to seal area from non-work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins. Install construction barriers and ceiling protection carefully, outside of normal work hours.
- 4) Maintain negative air pressure, 0.01 inches of water gauge, within work site utilizing HEPA equipped air filtration units and continuously monitored with a digital display, recording and alarm instrument, which must be calibrated on installation, maintained with periodic calibration and monitored by the contractor.
- 5) Contain construction waste before transport in tightly covered containers.
- 6) Cover transport receptacles or carts. Tape covering unless solid lid.

b. Upon Completion:

- 1) Do not remove barriers from work area until completed project is inspected by the COR and thoroughly cleaned by the VA Environmental Services Department.
- 2) Remove construction barriers and ceiling protection carefully to minimize spreading of dirt and debris associated with construction, outside of normal work hours.
- 3) Vacuum work area with HEPA filtered vacuums.
- 4) Wet mop area with cleaner/disinfectant.
- 5) Upon completion, restore HVAC system where work was performed.
- 6) Return permit to the COR
- 7) Class IV requirements:

c. During Construction Work:

- 1) Obtain permit from the COR
- 2) Isolate HVAC system in area where work is being done to prevent contamination of duct system.
- 3) Complete all critical barriers i.e. sheetrock, plywood, plastic, to seal area from non-work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins. Install construction barriers and ceiling protection carefully, outside of normal work hours.

- 4) Maintain negative air pressure within work site utilizing HEPA equipped air filtration units.
 - 5) Seal holes, pipes, conduits, and punctures.
 - 6) Construct anteroom and require all personnel to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving work site or they can wear cloth or paper coveralls that are removed each time they leave work site.
 - 7) All personnel entering work site are required to wear shoe covers. Shoe covers must be changed each time the worker exits the work area.
- d. Upon Completion:
- 1) Do not remove barriers from work area until completed project is inspected by the COR with thorough cleaning by the VA Environmental Services Dept.
 - 2) Remove construction barriers and ceiling protection carefully to minimize spreading of dirt and debris associated with construction, outside of normal work hours.
 - 3) Contain construction waste before transport in tightly covered containers.
 - 4) Cover transport receptacles or carts. Tape covering unless solid lid.
 - 5) Vacuum work area with HEPA filtered vacuums.
 - 6) Wet mop area with cleaner/disinfectant.
 - 7) Upon completion, restore HVAC system where work was performed.
 - 8) Return permit to the COR
 - 9) Barriers shall be erected as required based upon classification (Class III & IV requires barriers) and shall be constructed as follows:
4. Class III and IV - closed door with masking tape applied over the frame and door is acceptable for projects that can be contained in a single room.
 5. Construction, demolition or reconstruction not capable of containment within a single room must have the following barriers erected and made presentable on hospital occupied side:
 - a. Class III & IV - Drywall barrier erected with joints covered or sealed to prevent dust and debris from escaping.
 - b. Class III & IV - Seal all penetrations in existing barrier airtight.
 - c. Class III & IV - Barriers at penetration of ceiling envelopes, chases and ceiling spaces to stop movement air and debris.
 - d. Class IV only - Anteroom or double entrance openings that allow workers to remove protective clothing or vacuum off existing clothing.

- e. Class III & IV - At elevators shafts or stairways within the field of construction, overlapping flap minimum of two feet wide of polyethylene enclosures for personnel access.

C. Products and Materials:

1. Sheet Plastic: Fire retardant polystyrene, 6-mil thickness meeting local fire codes.
 2. Barrier Doors: Self-Closing solid core wood in steel frame, painted.
 3. Dust proof fire-rated drywall.
 4. High Efficiency Particulate Air-Equipped filtration machine rated at 95% capture of 0.3 microns including pollen, mold spores and dust particles. HEPA filters should have ASHRAE 85 or other prefilter to extend the useful life of the HEPA. Provide both primary and secondary filtrations units. Maintenance of equipment and replacement of the HEPA filters and other filters will be in accordance with manufacturer's instructions.
 5. Exhaust Hoses: Heavy duty, flexible steel reinforced; Ventilation Blower Hose
 6. Adhesive Walk-off Mats: Provide minimum size mats of 24 inches x 36 inches
 7. Disinfectant: Hospital-approved disinfectant or equivalent product
 8. Portable Ceiling Access Module
- D. Before any construction on site begins, all contractor personnel involved in the construction or renovation activity shall be educated and trained in infection prevention measures established by the medical center.
- E. A dust control program will be establish and maintained as part of the contractor's infection preventive measures in accordance with the FGI Guidelines for Design and Construction of Healthcare Facilities. Prior to start of work, prepare a plan detailing project-specific dust protection measures with associated product data, including periodic status reports, and submit to COR for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- F. Medical center Infection Control personnel will monitor for airborne disease (e.g. aspergillosis) during construction. A baseline of conditions will be established by the medical center prior to the start of work and periodically during the construction stage to determine impact of construction activities on indoor air quality with safe thresholds established.
- G. In general, the following preventive measures shall be adopted during construction to keep down dust and prevent mold.
1. Contractor shall verify that construction exhaust to exterior is not reintroduced to the medical center through intake vents, or building openings. HEPA filtration is required where the exhaust dust may reenter the medical center.

2. Exhaust hoses shall be exhausted so that dust is not reintroduced to the medical center.
3. Adhesive Walk-off/Carpet Walk-off Mats shall be used at all interior transitions from the construction area to occupied medical center area. These mats shall be changed as often as required to maintain clean work areas directly outside construction area at all times.
4. Vacuum and wet mop all transition areas from construction to the occupied medical center at the end of each workday. Vacuum shall utilize HEPA filtration. Maintain surrounding area frequently. Remove debris as it is created. Transport these outside the construction area in containers with tightly fitting lids.
5. The contractor shall not haul debris through patient-care areas without prior approval of the COR and the Medical Center. When, approved, debris shall be hauled in enclosed dust proof containers or wrapped in plastic and sealed with duct tape. No sharp objects should be allowed to cut through the plastic. Wipe down the exterior of the containers with a damp rag to remove dust. All equipment, tools, material, etc. transported through occupied areas shall be made free from dust and moisture by vacuuming and wipe down.
6. There shall be no standing water during construction. This includes water in equipment drip pans and open containers within the construction areas. All accidental spills must be cleaned up and dried within 12 hours. Remove and dispose of porous materials that remain damp for more than 72 hours.
7. At completion, remove construction barriers and ceiling protection carefully, outside of normal work hours. Vacuum and clean all surfaces free of dust after the removal.

H. Final Cleanup:

1. Upon completion of project, or as work progresses, remove all construction debris from above ceiling, vertical shafts and utility chases that have been part of the construction.
2. Perform HEPA vacuum cleaning of all surfaces in the construction area. This includes walls, ceilings, cabinets, furniture (built-in or free standing), partitions, flooring, etc.
3. All new air ducts shall be cleaned prior to final inspection.

I. Exterior Construction

1. Contractor shall verify that dust will not be introduced into the medical center through intake vents, or building openings. HEPA filtration on intake vents is required where dust may be introduced.
2. Dust created from disturbance of soil such as from vehicle movement will be wetted with use of a water truck as necessary
3. All cutting, drilling, grinding, sanding, or disturbance of materials shall be accomplished with tools equipped with either local exhaust ventilation (i.e. vacuum systems) or wet suppression controls.

1.13 TUBERCULOSIS SCREENING

- A. Contractor shall provide written certification that all contract employees assigned to the work site have had a pre-placement tuberculin screening within 90 days prior to assignment to the worksite and been found have negative TB screening reactions. Contractors shall be required to show documentation of negative TB screening reactions for any additional workers who are added after the 90-day requirement before they will be allowed to work on the work site. NOTE: This can be the Center for Disease Control (CDC) and Prevention and two-step skin testing or a Food and Drug Administration (FDA)-approved blood test.
 - 1. Contract employees manifesting positive screening reactions to the tuberculin shall be examined according to current CDC guidelines prior to working on VHA property.
 - 2. Subsequently, if the employee is found without evidence of active (infectious) pulmonary TB, a statement documenting examination by a physician shall be on file with the employer (construction contractor), noting that the employee with a positive tuberculin screening test is without evidence of active (infectious) pulmonary TB.
 - 3. If the employee is found with evidence of active (infectious) pulmonary TB, the employee shall require treatment with a subsequent statement to the fact on file with the employer before being allowed to return to work on VHA property.

1.14 FIRE SAFETY

- A. Fire Safety Plan: Establish and maintain a site-specific fire protection program in accordance with 29 CFR 1926. Prior to start of work, prepare a plan detailing project-specific fire safety measures, including periodic status reports, and submit to COR for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. This plan may be an element of the Accident Prevention Plan.
- B. Site and Building Access: Maintain free and unobstructed access to facility emergency services and for fire, police and other emergency response forces in accordance with NFPA 241.
- C. Separate temporary facilities, such as trailers, storage sheds, and dumpsters, from existing buildings and new construction by distances in accordance with NFPA 241. For small facilities with less than 6 m (20 feet) exposing overall length, separate by 3m (10 feet).
- D. Temporary Construction Partitions:
 - 1. Install and maintain temporary construction partitions to provide smoke-tight separations between construction areas and adjoining areas. Construct partitions of gypsum board or treated plywood (flame spread rating of 25 or less in accordance with ASTM E84) on both sides of fire retardant treated wood or metal steel studs. Extend the partitions through suspended ceilings to floor slab deck or roof. Seal joints and penetrations. At door openings, install Class C, 3/4 hour fire/smoke rated doors with self-closing devices.

2. Install temporary construction partitions as shown on drawings to maintain integrity of existing exit stair enclosures, exit passageways, fire-rated enclosures of hazardous areas, horizontal exits, smoke barriers, vertical shafts and openings enclosures.
 3. Close openings in smoke barriers and fire-rated construction to maintain fire ratings. Seal penetrations with listed through-penetration firestop materials in accordance with Section 07 84 00, FIRESTOPPING.
- E. Temporary Heating and Electrical: Install, use and maintain installations in accordance with 29 CFR 1926, NFPA 241 and NFPA 70.
- F. Means of Egress: Do not block exiting for occupied buildings, including paths from exits to roads. Minimize disruptions and coordinate with COR.
- G. Egress Routes for Construction Workers: Maintain free and unobstructed egress. Inspect daily. Report findings and corrective actions weekly to COR.
- H. Fire Extinguishers: Provide and maintain extinguishers in construction areas and temporary storage areas in accordance with 29 CFR 1926, NFPA 241 and NFPA 10.
- I. Flammable and Combustible Liquids: Store, dispense and use liquids in accordance with 29 CFR 1926, NFPA 241 and NFPA 30.
- J. Standpipes: Install and extend standpipes up with each floor in accordance with 29 CFR 1926 and NFPA 241. Do not charge wet standpipes subject to freezing until weather protected.
- K. Sprinklers: Install, test and activate new automatic sprinklers prior to removing existing sprinklers.
- L. Existing Fire Protection: Do not impair automatic sprinklers, smoke and heat detection, and fire alarm systems, except for portions immediately under construction, and temporarily for connections. Provide fire watch for impairments more than 4 hours in a 24-hour period. Request interruptions in accordance with Article, OPERATIONS AND STORAGE AREAS, and coordinate with COR. All existing or temporary fire protection systems (fire alarms, sprinklers) located in construction areas shall be tested as coordinated with the medical center. Parameters for the testing and results of any tests performed shall be recorded by the medical center and copies provided to the COR.
- M. Smoke Detectors: Prevent accidental operation. Remove temporary covers at end of work operations each day. Coordinate with COR.
- N. Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with COR. Obtain permits from COR at least 48 hours in advance
- O. Fire Hazard Prevention and Safety Inspections: Inspect entire construction areas weekly. Coordinate with, and report findings and corrective actions weekly to COR.

- P. Smoking: Smoking is prohibited in and adjacent to construction areas inside existing buildings and additions under construction. In separate and detached buildings under construction, smoking is prohibited except in designated smoking rest areas.
- Q. Dispose of waste and debris in accordance with NFPA 241. Remove from buildings daily.
- R. If required, submit documentation to the COR that personnel have been trained in the fire safety aspects of working in areas with impaired structural or compartmentalization features.

1.15 ELECTRICAL

- A. All electrical work shall comply with NFPA 70 (NEC), NFPA 70B, NFPA 70E, 29 CFR Part 1910 Subpart J - General Environmental Controls, 29 CFR Part 1910 Subpart S - Electrical, and 29 CFR 1926 Subpart K in addition to other references required by contract.
- B. All qualified persons performing electrical work under this contract shall be licensed journeyman or master electricians. All apprentice electricians performing under this contract shall be deemed unqualified persons unless they are working under the immediate supervision of a licensed electrician or master electrician.
- C. All electrical work will be accomplished de-energized and in the Electrically Safe Work Condition (refer to NFPA 70E for Work Involving Electrical Hazards, including Exemptions to Work Permit). Any Contractor, subcontractor or temporary worker who fails to fully comply with this requirement is subject to immediate termination in accordance with FAR clause 52.236-5(c). Only in rare circumstance where achieving an electrically safe work condition prior to beginning work would increase or cause additional hazards, or is infeasible due to equipment design or operational limitations is energized work permitted. The COR with approval of the Medical Center Director will make the determination if the circumstances would meet the exception outlined above. An AHA specific to energized work activities will be developed, reviewed, and accepted prior to the start of that work.
 - 1. Development of a Hazardous Electrical Energy Control Procedure is required prior to de-energization. A single Simple Lockout/Tagout Procedure for multiple work operations can only be used for work involving qualified person(s) de-energizing one set of conductors or circuit part source. Task specific Complex Lockout/Tagout Procedures are required at all other times.
 - 2. Verification of the absence of voltage after de-energization and lockout/tagout is considered "energized electrical work" (live work) under NFPA 70E, and shall only be performed by qualified persons wearing appropriate shock protective (voltage rated) gloves and arc rated personal protective clothing and equipment, using Underwriters Laboratories (UL) tested and appropriately rated contact electrical testing instruments or equipment appropriate for the environment in which they will be used.
 - 3. Personal Protective Equipment (PPE) and electrical testing instruments will be readily available for inspection by the COR.

- D. Before beginning any electrical work, an Activity Hazard Analysis (AHA) will be conducted to include Shock Hazard and Arc Flash Hazard analyses (NFPA Tables can be used only as a last alternative and it is strongly suggested a full Arc Flash Hazard Analyses be conducted). Work shall not begin until the AHA for the work activity has been accepted by the COR and discussed with all engaged in the activity, including the Contractor, subcontractor(s), and Government on-site representatives at preparatory and initial control phase meetings.
- E. Ground-fault circuit interrupters. All 120-volt, single-phase 15- and 20-ampere receptacle outlets on construction sites shall have approved ground-fault circuit interrupters for personnel protection. "Assured Equipment Grounding Conductor Program" only is not allowed.

1.16 FALL PROTECTION

- A. The fall protection (FP) threshold height requirement is 6 ft (1.8 m) for ALL WORK, unless specified differently or the OSHA 29 CFR 1926 requirements are more stringent, to include steel erection activities, systems-engineered activities (prefabricated) metal buildings, residential (wood) construction and scaffolding work.
 - 1. The use of a Safety Monitoring System (SMS) as a fall protection method is prohibited.
 - 2. The use of Controlled Access Zone (CAZ) as a fall protection method is prohibited.
 - 3. A Warning Line System (WLS) may ONLY be used on floors or flat or low-sloped roofs (between 0 - 18.4 degrees or 4:12 slope) and shall be erected around all sides of the work area (See 29 CFR 1926.502(f) for construction of WLS requirements). Working within the WLS does not require FP. No worker shall be allowed in the area between the roof or floor edge and the WLS without FP. FP is required when working outside the WLS.
 - 4. Fall protection while using a ladder will be governed by the OSHA requirements.

1.17 SCAFFOLDS AND OTHER WORK PLATFORMS

- A. All scaffolds and other work platforms construction activities shall comply with 29 CFR 1926 Subpart L.
- B. The fall protection (FP) threshold height requirement is 6 ft (1.8 m) as stated in Section 1.16.
- C. The following hierarchy and prohibitions shall be followed in selecting appropriate work platforms.
 - 1. Scaffolds, platforms, or temporary floors shall be provided for all work except that can be performed safely from the ground or similar footing.
 - 2. Ladders less than 20 feet may be used as work platforms only when use of small hand tools or handling of light material is involved.
 - 3. Ladder jacks, lean-to, and prop-scaffolds are prohibited.
 - 4. Emergency descent devices shall not be used as working platforms.

- D. Contractors shall use a scaffold tagging system in which all scaffolds are tagged by the Competent Person. Tags shall be color-coded: green indicates the scaffold has been inspected and is safe to use; red indicates the scaffold is unsafe to use. Tags shall be readily visible, made of materials that will withstand the environment in which they are used, be legible and shall include:
 - 1. The Competent Person's name and signature;
 - 2. Dates of initial and last inspections.
- E. Mast Climbing work platforms: When access ladders, including masts designed as ladders, exceed 20 ft (6 m) in height, positive fall protection shall be used.

1.18 EXCAVATION AND TRENCHES

- A. All excavation and trenching work shall comply with 29 CFR 1926 Subpart P.
- B. All excavations and trenches 5 feet in depth or greater shall require a written trenching and excavation permit (NOTE - some States and other local jurisdictions require separate state/jurisdiction-issued excavation permits). The permit shall be completed and provided to the COR prior to commencing work for the day. At the end of the day, the permit shall be closed out and provided to the COR. The permit shall be maintained onsite and include the following:
 - 1. Determination of soil classification
 - 2. Indication that utilities have been located and identified. If utilities could not be located after all reasonable attempt, then excavating operations will proceed cautiously.
 - 3. Indication of selected excavation protective system.
 - 4. Indication that the spoil pile will be stored at least 2 feet from the edge of the excavation and safe access provided within 25 feet of the workers.
 - 5. Indication of assessment for a potential toxic, explosive, or oxygen deficient atmosphere.
- C. If not using an engineered protective system such as a trench box, shielding, shoring, or other Professional Engineer designed system and using a sloping or benching system, soil classification cannot be Solid Rock or Type A. All soil will be classified as Type B or Type C and sloped or benched in accordance with Appendix B of 29 CFR 1926.

1.19 CRANES

- A. All crane work shall comply with 29 CFR 1926 Subpart CC.
- B. Prior to operating a crane, the operator must be licensed, qualified or certified to operate the crane. Thus, all the provisions contained with Subpart CC are effective and there is no "Phase In" date of November 10, 2014.

- C. A detailed lift permit shall be submitted 14 days prior to the scheduled lift complete with route for truck carrying load, crane load analysis, siting of crane and path of swing. The lift will not be allowed without approval of this document.
- D. Crane operators shall not carry loads
 - 1. Over the general public or VAMC personnel
 - 2. Over any occupied building unless
 - a. The top two floors are vacated
 - b. Or overhead protection with a design live load of 300 psf is provided

1.20 CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)

- A. All installation, maintenance, and servicing of equipment or machinery shall comply with 29 CFR 1910.147 except for specifically referenced operations in 29 CFR 1926 such as concrete & masonry equipment 1926.702(j), heavy machinery & equipment 1926.600(a)(3)(i), and process safety management of highly hazardous chemicals (1926.64). Control of hazardous electrical energy during the installation, maintenance, or servicing of electrical equipment shall comply with Section 1.15 to include NFPA 70E and other VA specific requirements discussed in the section.

1.21 CONFINED SPACE ENTRY

- A. All confined space entry shall comply with 29 CFR 1910.146 except for specifically referenced operations in 29 CFR 1926 such as excavations/trenches 1926.651(g).
- B. A site-specific Confined Space Entry Plan (including permitting process) shall be developed and submitted to the COR.

1.22 WELDING AND CUTTING

- A. As specified in section 1.14, Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with COR. Obtain permits from COR at least 48 hours in advance .

1.23 LADDERS

- A. All Ladder use shall comply with 29 CFR 1926 Subpart X.
- B. All portable ladders shall be of sufficient length and shall be placed so that workers will not stretch or assume a hazardous position.
- C. Manufacturer safety labels shall be in place on ladders
- D. Step Ladders shall not be used in the closed position
- E. Top steps or cap of step ladders shall not be used as a step
- F. Portable ladders, used as temporary access, shall extend at least 3 ft (0.9 m) above the upper landing surface.
 - 1. When a 3 ft (0.9-m) extension is not possible, a grasping device (such as a grab rail) shall be provided to assist workers in mounting and dismounting the ladder.

2. In no case shall the length of the ladder be such that ladder deflection under a load would, by itself, cause the ladder to slip from its support.
- G. Ladders shall be inspected for visible defects on a daily basis and after any occurrence that could affect their safe use. Broken or damaged ladders shall be immediately tagged "DO NOT USE," or with similar wording, and withdrawn from service until restored to a condition meeting their original design.

1.24 FLOOR & WALL OPENINGS

- A. All floor and wall openings shall comply with 29 CFR 1926 Subpart M.
- B. Floor and roof holes/openings are any that measure over 2 in (51 mm) in any direction of a walking/working surface which persons may trip or fall into or where objects may fall to the level below. See 21.F for covering and labeling requirements. Skylights located in floors or roofs are considered floor or roof hole/openings.
- C. All floor, roof openings or hole into which a person can accidentally walk or fall through shall be guarded either by a railing system with toeboards along all exposed sides or a load-bearing cover. When the cover is not in place, the opening or hole shall be protected by a removable guardrail system or shall be attended when the guarding system has been removed, or other fall protection system.
 1. Covers shall be capable of supporting, without failure, at least twice the weight of the worker, equipment and material combined.
 2. Covers shall be secured when installed, clearly marked with the word "HOLE", "COVER" or "Danger, Roof Opening-Do Not Remove" or color-coded or equivalent methods (e.g., red or orange "X"). Workers must be made aware of the meaning for color coding and equivalent methods.
 3. Roofing material, such as roofing membrane, insulation or felts, covering or partly covering openings or holes, shall be immediately cut out. No hole or opening shall be left unattended unless covered.
 4. Non-load-bearing skylights shall be guarded by a load-bearing skylight screen, cover, or railing system along all exposed sides.
 5. Workers are prohibited from standing/walking on skylights.

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SECTION 01 42 19
REFERENCE STANDARDS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the availability and source of references and standards specified in the project manual under paragraphs APPLICABLE PUBLICATIONS and/or shown on the drawings.

1.2 AVAILABILITY OF SPECIFICATIONS LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS FPMR PART 101-29 (FAR 52.211-1) (AUG 1998)

- A. The GSA Index of Federal Specifications, Standards and Commercial Item Descriptions, FPMR Part 101-29 and copies of specifications, standards, and commercial item descriptions cited in the solicitation may be obtained for a fee by submitting a request to - GSA Federal Supply Service, Specifications Section, Suite 8100, 470 East L'Enfant Plaza, SW, Washington, DC 20407, Telephone (202) 619-8925, Facsimile (202) 619-8978.
- B. If the General Services Administration, Department of Agriculture, or Department of Veterans Affairs issued this solicitation, a single copy of specifications, standards, and commercial item descriptions cited in this solicitation may be obtained free of charge by submitting a request to the addressee in paragraph (a) of this provision. Additional copies will be issued for a fee.

1.3 AVAILABILITY FOR EXAMINATION OF SPECIFICATIONS NOT LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM descriptions (FAR 52.211-4) (JUN 1988)

- A. The specifications and standards cited in this solicitation can be examined at the following location:
1. DEPARTMENT OF VETERANS AFFAIRS
 2. Office of Construction & Facilities Management
 3. Facilities Quality Service (00CFM1A)
 4. 425 Eye Street N.W, (sixth floor)
 5. Washington, DC 20001
 6. Telephone Numbers: (202) 632-5249 or (202) 632-5178
 7. Between 9:00 AM - 3:00 PM

1.4 AVAILABILITY OF SPECIFICATIONS NOT LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS (FAR 52.211-3) (JUN 1988)

- A. The specifications cited in this solicitation may be obtained from the associations or organizations listed below.
- B. AA Aluminum Association Inc.
1. <http://www.aluminum.org>

- C. AABC Associated Air Balance Council
 - 1. <http://www.aabchq.com>
- D. AAMA American Architectural Manufacturer's Association
 - 1. <http://www.aamanet.org>
- E. AAN American Nursery and Landscape Association
 - 1. <http://www.anla.org>
- F. AASHTO American Association of State Highway and Transportation Officials
 - 1. <http://www.aashto.org>
- G. AATCC American Association of Textile Chemists and Colorists
 - 1. <http://www.aatcc.org>
- H. ACGIH American Conference of Governmental Industrial Hygienists
 - 1. <http://www.acgih.org>
- I. ACI American Concrete Institute
 - 1. <http://www.aci-int.net>
- J. ACPA American Concrete Pipe Association
 - 1. <http://www.concrete-pipe.org>
- K. ACPPA American Concrete Pressure Pipe Association
 - 1. <http://www.acppa.org>
- L. ADC Air Diffusion Council
 - 1. <http://flexibleduct.org>
- M. AGA American Gas Association
 - 1. <http://www.aga.org>
- N. AGC Associated General Contractors of America
 - 1. <http://www.agc.org>
- O. AGMA American Gear Manufacturers Association, Inc.
 - 1. <http://www.agma.org>
- P. AHAM Association of Home Appliance Manufacturers
 - 1. <http://www.aham.org>
- Q. AISC American Institute of Steel Construction
 - 1. <http://www.aisc.org>
- R. AISI American Iron and Steel Institute
 - 1. <http://www.steel.org>
- S. AITC American Institute of Timber Construction
 - 1. <http://www.aitc-glulam.org>
- T. AMCA Air Movement and Control Association, Inc.
 - 1. <http://www.amca.org>

- U. ANLA American Nursery & Landscape Association
1. <http://www.anla.org>
- V. ANSI American National Standards Institute, Inc.
1. <http://www.ansi.org>
- W. APA The Engineered Wood Association
1. <http://www.apawood.org>
- X. ARI Air-Conditioning and Refrigeration Institute
1. <http://www.ari.org>
- Y. ASAE American Society of Agricultural Engineers
1. <http://www.asae.org>
- Z. ASCE American Society of Civil Engineers
1. <http://www.asce.org>
- AA. ASHRAE American Society of Heating, Refrigerating, and
Air-Conditioning Engineers
1. <http://www.ashrae.org>
- BB. ASME American Society of Mechanical Engineers
1. <http://www.asme.org>
- CC. ASSE American Society of Sanitary Engineering
1. <http://www.asse-plumbing.org>
- DD. ASTM American Society for Testing and Materials
1. <http://www.astm.org>
- EE. AWI Architectural Woodwork Institute
1. <http://www.awinet.org>
- FF. AWS American Welding Society
1. <http://www.aws.org>
- GG. AWWA American Water Works Association
1. <http://www.awwa.org>
- HH. BHMA Builders Hardware Manufacturers Association
1. <http://www.buildershardware.com>
- II. BIA Brick Institute of America
1. <http://www.bia.org>
- JJ. CAGI Compressed Air and Gas Institute
1. <http://www.cagi.org>
- KK. CGA Compressed Gas Association, Inc.
1. <http://www.cganet.com>
- LL. CI The Chlorine Institute, Inc.
1. <http://www.chlorineinstitute.org>

- MM. CISCA Ceilings and Interior Systems Construction Association
1. <http://www.cisca.org>
- NN. CISPI Cast Iron Soil Pipe Institute
1. <http://www.cispi.org>
- OO. CLFMI Chain Link Fence Manufacturers Institute
1. <http://www.chainlinkinfo.org>
- PP. CPMB Concrete Plant Manufacturers Bureau
1. <http://www.cpmc.org>
- QQ. CRA California Redwood Association
1. <http://www.calredwood.org>
- RR. CRSI Concrete Reinforcing Steel Institute
1. <http://www.crsi.org>
- SS. CTI Cooling Technology Institute
1. <http://www.cti.org>
- TT. DHI Door and Hardware Institute
1. <http://www.dhi.org>
- UU. EGSA Electrical Generating Systems Association
1. <http://www.egsa.org>
- VV. EEI Edison Electric Institute
1. <http://www.eei.org>
- WW. EPA Environmental Protection Agency
1. <http://www.epa.gov>
- XX. ETL ETL Testing Laboratories, Inc.
1. <http://www.etl.com>
- YY. FAA Federal Aviation Administration
1. <http://www.faa.gov>
- ZZ. FCC Federal Communications Commission
1. <http://www.fcc.gov>
- AAA. FPS The Forest Products Society
1. <http://www.forestprod.org>
- BBB. GANA Glass Association of North America
1. <http://www.cssinfo.com/info/gana.html/>
- CCC. FM Factory Mutual Insurance
1. <http://www.fmglobal.com>
- DDD. GA Gypsum Association
1. <http://www.gypsum.org>

- EEE. GSA General Services Administration
1. <http://www.gsa.gov>
- FFF. HI Hydraulic Institute
1. <http://www.pumps.org>
- GGG. HPVA Hardwood Plywood & Veneer Association
1. <http://www.hpva.org>
- HHH. ICBO International Conference of Building Officials
1. <http://www.icbo.org>
- III. ICEA Insulated Cable Engineers Association Inc.
1. <http://www.icea.net>
- JJJ. ICAC Institute of Clean Air Companies
1. <http://www.icac.com>
- KKK. IEEE Institute of Electrical and Electronics Engineers
1. <http://www.ieee.org/>
- LLL. IMSA International Municipal Signal Association
1. <http://www.imsasafety.org>
- MMM. IPCEA Insulated Power Cable Engineers Association
- NNN. NBMA Metal Buildings Manufacturers Association
1. <http://www.mbma.com>
- OOO. MSS Manufacturers Standardization Society of the Valve and Fittings Industry Inc.
1. <http://www.mss-hq.com>
- PPP. NAAMM National Association of Architectural Metal Manufacturers
1. <http://www.naamm.org>
- QQQ. NAPHCC Plumbing-Heating-Cooling Contractors Association
1. <http://www.phccweb.org.org>
- RRR. NBS National Bureau of Standards
1. See - NIST
- SSS. NBBPVI National Board of Boiler and Pressure Vessel Inspectors
1. <http://www.nationboard.org>
- TTT. NEC National Electric Code
1. See - NFPA National Fire Protection Association
- UUU. NEMA National Electrical Manufacturers Association
1. <http://www.nema.org>
- VVV. NFPA National Fire Protection Association
1. <http://www.nfpa.org>
- WWW. NHLA National Hardwood Lumber Association

BID ISSUE
04/24/2015

VAMC WADE PARK
PROVIDE SMOKE SHELTER
PROJECT #:541-17-212

1. <http://www.natlhardwood.org>
- XXX. NIH National Institute of Health
 1. <http://www.nih.gov>
- YYY. NIST National Institute of Standards and Technology
 1. <http://www.nist.gov>
- ZZZ. NLMA Northeastern Lumber Manufacturers Association, Inc.
 1. <http://www.nelma.org>
- AAAA. NPA National Particleboard Association
 1. 18928 Premiere Court
 2. Gaithersburg, MD 20879
 3. (301) 670-0604
- BBBB. NSF National Sanitation Foundation
 1. <http://www.nsf.org>
- CCCC. NWWDA Window and Door Manufacturers Association
 1. <http://www.nwwda.org>
- DDDD. OSHA Occupational Safety and Health Administration
 1. Department of Labor
 2. <http://www.osha.gov>
- EEEE. PCA Portland Cement Association
 1. <http://www.portcement.org>
- FFFF. PCI Precast Prestressed Concrete Institute
 1. <http://www.pci.org>
- GGGG. PPI The Plastic Pipe Institute
 1. <http://www.plasticpipe.org>
- HHHH. PEI Porcelain Enamel Institute, Inc.
 1. <http://www.porcelainenamel.com>
- IIII. PTI Post-Tensioning Institute
 1. <http://www.post-tensioning.org>
- JJJJ. RFCI The Resilient Floor Covering Institute
 1. <http://www.rfci.com>
- KKKK. RIS Redwood Inspection Service
 1. See - CRA
- LLLL. RMA Rubber Manufacturers Association, Inc.
 1. <http://www.rma.org>
- MMMM. SCMA Southern Cypress Manufacturers Association
 1. <http://www.cypressinfo.org>

BID ISSUE
04/24/2015

VAMC WADE PARK
PROVIDE SMOKE SHELTER
PROJECT #:541-17-212

- NNNN. SDI Steel Door Institute
1. <http://www.steeldoor.org>
- OOOO. IGMA Insulating Glass Manufacturers Alliance
1. <http://www.igmaonline.org>
- PPPP. SJI Steel Joist Institute
1. <http://www.steeljoist.org>
- QQQQ. SMACNA Sheet Metal and Air-Conditioning Contractors National Association, Inc.
1. <http://www.smacna.org>
- RRRR. SSPC The Society for Protective Coatings
1. <http://www.sspc.org>
- SSSS. STI Steel Tank Institute
1. <http://www.steeltank.com>
- TTTT. SWI Steel Window Institute
1. <http://www.steelwindows.com>
- UUUU. TCA Tile Council of America, Inc.
1. <http://www.tileusa.com>
- VVVV. TEMA Tubular Exchange Manufacturers Association
1. <http://www.tema.org>
- WWWW. TPI Truss Plate Institute, Inc.
1. 583 D'Onofrio Drive; Suite 200
2. Madison, WI 53719
3. (608) 833-5900
- XXXX. UBC The Uniform Building Code
1. See ICBO
- YYYY. UL Underwriters' Laboratories Incorporated
1. <http://www.ul.com>
- ZZZZ. ULC Underwriters' Laboratories of Canada
1. <http://www.ulc.ca>
- AAAAA. WCLIB West Coast Lumber Inspection Bureau
1. 6980 SW Varns Road, P.O. Box 23145
2. Portland, OR 97223
3. (503) 639-0651
- BBBBB. WRCLA Western Red Cedar Lumber Association
1. Box 120786
2. New Brighton, MN 55112
3. (612) 633-4334

BID ISSUE
04/24/2015

VAMC WADE PARK
PROVIDE SMOKE SHELTER
PROJECT #:541-17-212

CCCCC. WWPAA Western Wood Products Association

1. <http://www.wwpa.org>

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SECTION 01 45 29
TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies materials testing activities and inspection services required during project construction to be provided by a Testing Laboratory retained by the Contractor.

1.2 APPLICABLE PUBLICATIONS:

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.
- B. American Association of State Highway and Transportation Officials (AASHTO):
 - T27-11.....Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates
 - T96-02 (R2006).....Standard Method of Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
 - T99-10.....Standard Method of Test for Moisture-Density Relations of Soils Using a 2.5 Kg (5.5 lb.) Rammer and a 305 mm (12 in.) Drop
 - T104-99 (R2007).....Standard Method of Test for Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
 - T191-02(R2006).....Standard Method of Test for Density of Soil In-Place by the Sand-Cone Method
- C. American Society for Testing and Materials (ASTM):
 - C31/C31M-10.....Standard Practice for Making and Curing Concrete Test Specimens in the Field
 - C33/C33M-11a.....Standard Specification for Concrete Aggregates
 - C39/C39M-12.....Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
 - C136-06.....Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
 - C138/C138M-10b.....Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
 - C143/C143M-10a.....Standard Test Method for Slump of Hydraulic Cement Concrete

C172/C172M-10.....Standard Practice for Sampling Freshly Mixed Concrete

C173/C173M-10b.....Standard Test Method for Air Content of freshly Mixed Concrete by the Volumetric Method

C1064/C1064M-11.....Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete

C1077-11c.....Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation

D422-63(2007).....Standard Test Method for Particle-Size Analysis of Soils

D698-07e1.....Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort

D1140-00(2006).....Standard Test Methods for Amount of Material in Soils Finer than No. 200 Sieve

D1556-07.....Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

D1557-09.....Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft lbf/ft³ (2,700 KNm/m³))

D2166-06.....Standard Test Method for Unconfined Compressive Strength of Cohesive Soil

D2167-08).....Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method

D2216-10.....Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

D2974-07a.....Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils

D3666-11.....Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials

D6938-10.....Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

1.3 REQUIREMENTS:

- A. Accreditation Requirements: Construction materials testing laboratories must be accredited by a laboratory accreditation authority and will be

required to submit a copy of the Certificate of Accreditation and Scope of Accreditation. The laboratory's scope of accreditation must include the appropriate ASTM standards (i.e.; E329, C1077, D3666, D3740, A880, E543) listed in the technical sections of the specifications. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA. The policy applies to the specific laboratory performing the actual testing, not just the "Corporate Office."

- B. Inspection and Testing: Testing laboratory shall inspect materials and workmanship and perform tests described herein and additional tests requested by COE. When it appears materials furnished, or work performed by Contractor fail to meet construction contract requirements, Testing Laboratory shall direct attention of COE to such failure.
- C. Written Reports: Testing laboratory shall submit test reports to COE, Contractor, unless other arrangements are agreed to in writing by the COE. Submit reports of tests that fail to meet construction contract requirements on colored paper.
- D. Verbal Reports: Give verbal notification to COE immediately of any irregularity.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EARTHWORK:

- A. General: The Testing Laboratory shall provide qualified personnel, materials, equipment, and transportation as required to perform the services identified/required herein, within the agreed to schedule and/or time frame. The work to be performed shall be as identified herein and shall include but not be limited to the following:
 - 1. Observe fill and subgrades during proof-rolling to evaluate suitability of surface material to receive fill or base course. Provide recommendations to the COE regarding suitability or unsuitability of areas where proof-rolling was observed. Where unsuitable results are observed, witness excavation of unsuitable material and recommend to COE extent of removal and replacement of unsuitable materials and observe proof-rolling of replaced areas until satisfactory results are obtained.
 - 2. Provide part time observation of fill placement and compaction and field density testing in building areas and provide part time observation of fill placement and compaction and field density

testing in pavement areas to verify that earthwork compaction obtained is in accordance with contract documents.

3. Provide supervised geotechnical technician to inspect excavation, subsurface preparation, and backfill for structural fill.

B. Testing Compaction:

1. Determine maximum density and optimum moisture content for each type of fill, backfill and subgrade material used, in compliance with AASHTO T99/T180.

2. Make field density tests in accordance with the primary testing method following ASTM D6938.

- a. Building Slab Subgrade: At least one test of subgrade for every 185 m² (2000 square feet) of building slab, but in no case fewer than three tests. In each compacted fill layer, perform one test for every 185 m² (2000 square feet) of overlaying building slab, but in no case fewer than three tests.
- b. Pavement Subgrade: One test for each 335 m² (400 square yards), but in no case fewer than two tests.
- c. Curb, Gutter, and Sidewalk: One test for each 90 m (300 feet), but in no case fewer than two tests.
- d. Trenches: One test at maximum 30 m (100 foot) intervals per 1200 mm (4 foot) of vertical lift and at changes in required density, but in no case fewer than two tests.

- C. Fill and Backfill Material Gradation: One test per 10 yards stockpiled or in-place source material. Gradation of fill and backfill material shall be determined in accordance with ASTM C136.

- D. Testing Materials: Test suitability of on-site and off-site borrow as directed by COE.

3.2 LANDSCAPING:

- A. Test topsoil for organic materials, pH, phosphate, potash content, and gradation of particles.

1. Test for organic material by using ASTM D2974.
2. Determine percent of silt, sand, clay, and foreign materials such as rock, roots, and vegetation.

- B. Submit laboratory test report of topsoil to COE.

3.3 SITE WORK CONCRETE:

Test site work concrete including materials for concrete as required in Article CONCRETE of this section.

3.4 CONCRETE:

A. Batch Plant Inspection and Materials Testing:

1. Perform continuous batch plant inspection until concrete quality is established to satisfaction of COE.
2. Periodically inspect and test batch proportioning equipment for accuracy and report deficiencies to COE.
3. Sample and test mix ingredients as necessary to insure compliance with specifications.
4. Sample and test aggregates daily and as necessary for moisture content. Test the dry rodded weight of the coarse aggregate whenever a sieve analysis is made, and when it appears there has been a change in the aggregate.
5. Certify, in duplicate, ingredients and proportions and amounts of ingredients in concrete conform to approved trial mixes. When concrete is batched or mixed off immediate building site, certify (by signing, initialing or stamping thereon) on delivery slips (duplicate) that ingredients in truck-load mixes conform to proportions of aggregate weight, cement factor, and water-cement ratio of approved trial mixes.

B. Field Inspection and Materials Testing:

1. Provide a technician at site of placement at all times to perform concrete sampling and testing.
2. Review the delivery tickets of the ready-mix concrete trucks arriving on-site. Notify the Contractor if the concrete cannot be placed within the specified time limits or if the type of concrete delivered is incorrect. Reject any loads that do not comply with the Specification requirements. Rejected loads are to be removed from the site at the Contractor's expense. Any rejected concrete that is placed will be subject to removal.
3. Take concrete samples at point of placement in accordance with ASTM C172. Mold and cure compression test cylinders in accordance with ASTM C31. Make at least three cylinders for each 40 m³ (50 cubic yards) or less of each concrete type, and at least three cylinders for any one day's pour for each concrete type. After good concrete quality control has been established and maintained as determined by COE make three cylinders for each 80 m³ (100 cubic yards) or less of each concrete type, and at least three cylinders from any one day's pour for each concrete type. Label each cylinder with an

- identification number. COE may require additional cylinders to be molded and cured under job conditions.
4. Perform slump tests in accordance with ASTM C143. Test the first truck each day, and every time test cylinders are made. Test pumped concrete at the hopper and at the discharge end of the hose at the beginning of each day's pumping operations to determine change in slump.
 5. Determine the air content of concrete per ASTM C173. For concrete required to be air-entrained, test the first truck and every 20 m³ (25 cubic yards) thereafter each day. For concrete not required to be air-entrained, test every 80 m³ (100 cubic yards) at random. For pumped concrete, initially test concrete at both the hopper and the discharge end of the hose to determine change in air content.
 6. If slump or air content fall outside specified limits, make another test immediately from another portion of same batch.
 7. Perform unit weight tests in compliance with ASTM C138 for normal weight concrete and ASTM C567 for lightweight concrete. Test the first truck and each time cylinders are made.
 8. Notify laboratory technician at batch plant of mix irregularities and request materials and proportioning check.
 9. Verify that specified mixing has been accomplished.
 10. Environmental Conditions: Determine the temperature per ASTM C1064 for each truckload of concrete during hot weather and cold weather concreting operations:
 - a. When ambient air temperature falls below 4.4 degrees C (40 degrees F), record maximum and minimum air temperatures in each 24 hour period; record air temperature inside protective enclosure; record minimum temperature of surface of hardened concrete.
 - b. When ambient air temperature rises above 29.4 degrees C (85 degrees F), record maximum and minimum air temperature in each 24 hour period; record minimum relative humidity; record maximum wind velocity; record maximum temperature of surface of hardened concrete.
 11. Inspect the reinforcing steel placement, including bar size, bar spacing, top and bottom concrete cover, proper tie into the chairs, and grade of steel prior to concrete placement. Submit detailed report of observations.

12. Observe conveying, placement, and consolidation of concrete for conformance to specifications.
 13. Observe condition of formed surfaces upon removal of formwork prior to repair of surface defects and observe repair of surface defects.
 14. Observe curing procedures for conformance with specifications, record dates of concrete placement, start of preliminary curing, start of final curing, end of curing period.
 15. Observe preparations for placement of concrete:
 - a. Inspect handling, conveying, and placing equipment, inspect vibrating and compaction equipment.
 - b. Inspect preparation of construction, expansion, and isolation joints.
 16. Observe preparations for protection from hot weather, cold weather, sun, and rain, and preparations for curing.
 17. Observe concrete mixing:
 - a. Monitor and record amount of water added at project site.
 - b. Observe minimum and maximum mixing times.
- C. Laboratory Tests of Field Samples:
1. Test compression test cylinders for strength in accordance with ASTM C39. For each test series, test one cylinder at 7 days and one cylinder at 28 days. Use remaining cylinder as a spare tested as directed by COE. Compile laboratory test reports as follows:
Compressive strength test shall be result of one cylinder, except when one cylinder shows evidence of improper sampling, molding or testing, in which case it shall be discarded and strength of spare cylinder shall be used.
 2. Make weight tests of hardened lightweight structural concrete in accordance with ASTM C567.
 3. Furnish certified compression test reports (duplicate) to COE. In test report, indicate the following information:
 - a. Cylinder identification number and date cast.
 - b. Specific location at which test samples were taken.
 - c. Type of concrete, slump, and percent air.
 - d. Compressive strength of concrete in MPa (psi).
 - e. Weight of lightweight structural concrete in kg/m³ (pounds per cubic feet).
 - f. Weather conditions during placing.

- g. Temperature of concrete in each test cylinder when test cylinder was molded.
- h. Maximum and minimum ambient temperature during placing.
- i. Ambient temperature when concrete sample in test cylinder was taken.
- j. Date delivered to laboratory and date tested.

3.5 REINFORCEMENT:

- A. Review mill test reports furnished by Contractor.
- B. Make one tensile and one bend test in accordance with ASTM A370 from each pair of samples obtained.
- C. Written report shall include, in addition to test results, heat number, manufacturer, type and grade of steel, and bar size.
- D. Perform tension tests of mechanical and welded splices in accordance with ASTM A370.

3.6 TYPE OF TEST:

Approximate Number of Tests Required

A. Earthwork:

Laboratory Compaction Test, Soils:

| | |
|---|---|
| AASHTO T99 and ASTM D698 | 3 |
| Field Density, Soils (AASHTO T191, T205, or T238) | 3 |
| Penetration Test, Soils | 6 |

B. Landscaping:

| | |
|--------------|---|
| Topsoil Test | 3 |
|--------------|---|

C. Aggregate Base:

| | |
|---|---|
| Laboratory Compaction, AASHTO T180 | 2 |
| Field Density, AASHTO T191 | 3 |
| Aggregate, Base Course Gradation (AASHTO T27) | 1 |

D. Concrete:

| | |
|--|---|
| Making and Curing Concrete Test Cylinders (ASTM C31) | 9 |
| Compressive Strength, Test Cylinders (ASTM C39) | 9 |
| Concrete Slump Test (ASTM C143) | 3 |
| Concrete Air Content Test (ASTM C173) | 3 |
| Aggregate, Normal Weight: Gradation (ASTM C33) | 1 |

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SECTION 01 57 19
TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the control of environmental pollution and damage that the Contractor must consider for air, water, and land resources. It includes management of visual aesthetics, noise, solid waste, radiant energy, and radioactive materials, as well as other pollutants and resources encountered or generated by the Contractor. The Contractor is obligated to consider specified control measures with the costs included within the various contract items of work.
- B. Environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents which:
 - 1. Adversely effect human health or welfare,
 - 2. Unfavorably alter ecological balances of importance to human life,
 - 3. Effect other species of importance to humankind, or;
 - 4. Degrade the utility of the environment for aesthetic, cultural, and historical purposes.
- C. Definitions of Pollutants:
 - 1. Chemical Waste: Petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals, and inorganic wastes.
 - 2. Debris: Combustible and noncombustible wastes, such as leaves, tree trimmings, ashes, and waste materials resulting from construction or maintenance and repair work.
 - 3. Sediment: Soil and other debris that has been eroded and transported by runoff water.
 - 4. Solid Waste: Rubbish, debris, garbage, and other discarded solid materials resulting from industrial, commercial, and agricultural operations and from community activities.
 - 5. Surface Discharge: The term "Surface Discharge" implies that the water is discharged with possible sheeting action and subsequent soil erosion may occur. Waters that are surface discharged may terminate in drainage ditches, storm sewers, creeks, and/or "water of the United States" and would require a permit to discharge water from the governing agency.
 - 6. Rubbish: Combustible and noncombustible wastes such as paper, boxes, glass and crockery, metal and lumber scrap, tin cans, and bones.
 - 7. Sanitary Wastes:
 - a. Sewage: Domestic sanitary sewage and human and animal waste.
 - b. Garbage: Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

1.2 QUALITY CONTROL

- A. Establish and maintain quality control for the environmental protection of all items set forth herein.
- B. Record on daily reports any problems in complying with laws, regulations, and ordinances. Note any corrective action taken.

1.3 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
- B. U.S. National Archives and Records Administration (NARA):
 - 1. 33 CFR 328 Definitions

1.4 SUBMITTALS

- A. In accordance with Section, 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:
 - 1. Environmental Protection Plan: After the contract is awarded and prior to the commencement of the work, the Contractor shall meet with the COR to discuss the proposed Environmental Protection Plan and to develop mutual understanding relative to details of environmental protection. Not more than 20 days after the meeting, the Contractor shall prepare and submit to the COR for approval, a written and/or graphic Environmental Protection Plan including, but not limited to, the following:
 - a. Name(s) of person(s) within the Contractor's organization who is (are) responsible for ensuring adherence to the Environmental Protection Plan.
 - b. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site.
 - c. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel.
 - d. Description of the Contractor's environmental protection personnel training program.
 - e. A list of Federal, State, and local laws, regulations, and permits concerning environmental protection, pollution control, noise control and abatement that are applicable to the Contractor's proposed operations and the requirements imposed by those laws, regulations, and permits.
 - f. Methods for protection of features to be preserved within authorized work areas including trees, shrubs, vines, grasses, ground cover, landscape features, air and water quality, fish and wildlife, soil, historical, and archeological and cultural resources.
 - g. Procedures to provide the environmental protection that comply with the applicable laws and regulations. Describe the procedures to correct pollution of the environment due to accident, natural causes, or failure to follow the procedures as described in the Environmental Protection Plan.

- h. Permits, licenses, and the location of the solid waste disposal area.
 - i. Drawings showing locations of any proposed temporary excavations or embankments for haul roads, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials. Include as part of an Erosion Control Plan approved by the District Office of the U.S. Soil Conservation Service and the Department of Veterans Affairs.
 - j. Environmental Monitoring Plans for the job site including land, water, air, and noise.
 - k. Work Area Plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Plan should include measures for marking the limits of use areas. This plan may be incorporated within the Erosion Control Plan.
- B. Approval of the Contractor's Environmental Protection Plan will not relieve the Contractor of responsibility for adequate and continued control of pollutants and other environmental protection measures.

1.5 PROTECTION OF ENVIRONMENTAL RESOURCES

- A. Protect environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire period of this contract. Confine activities to areas defined by the specifications and drawings.
- B. Protection of Land Resources: Prior to construction, identify all land resources to be preserved within the work area. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, top soil, and land forms without permission from the COR. Do not fasten or attach ropes, cables, or guys to trees for anchorage unless specifically authorized, or where special emergency use is permitted.
 - 1. Work Area Limits: Prior to any construction, mark the areas that require work to be performed under this contract. Mark or fence isolated areas within the general work area that are to be saved and protected. Protect monuments, works of art, and markers before construction operations begin. Convey to all personnel the purpose of marking and protecting all necessary objects.
 - 2. Protection of Landscape: Protect trees, shrubs, vines, grasses, land forms, and other landscape features shown on the drawings to be preserved by marking, fencing, or using any other approved techniques.
 - a. Box and protect from damage existing trees and shrubs to remain on the construction site.
 - b. Immediately repair all damage to existing trees and shrubs by trimming, cleaning, and painting with antiseptic tree paint.
 - c. Do not store building materials or perform construction activities closer to existing trees or shrubs than the farthest extension of their limbs.

3. Reduction of Exposure of Unprotected Erodible Soils: Plan and conduct earthwork to minimize the duration of exposure of unprotected soils. Clear areas in reasonably sized increments only as needed to use. Form earthwork to final grade as shown. Immediately protect side slopes and back slopes upon completion of rough grading.
 4. Temporary Protection of Disturbed Areas: Construct diversion ditches, benches, and berms to retard and divert runoff from the construction site to protected drainage areas approved under paragraph 208 of the Clean Water Act.
 - a. Institute effluent quality monitoring programs as required by Federal, State, and local environmental agencies.
 5. Erosion and Sedimentation Control Devices: The erosion and sediment controls selected and maintained by the Contractor shall be such that water quality standards are not violated as a result of the Contractor's activities. Construct or install all temporary and permanent erosion and sedimentation control features on the Environmental Protection Plan. Maintain temporary erosion and sediment control measures such as berms, dikes, drains, sedimentation basins, grassing, and mulching, until permanent drainage and erosion control facilities are completed and operative.
 6. Manage borrow areas on Government property to minimize erosion and to prevent sediment from entering nearby water courses or lakes.
 7. Manage and control spoil areas on Government property to limit spoil to areas on the Environmental Protection Plan.
 8. Protect adjacent areas from despoilment by temporary excavations and embankments.
 9. Handle and dispose of solid wastes in such a manner that will prevent contamination of the environment. Place solid wastes (excluding clearing debris) in containers that are emptied on a regular schedule. Transport all solid waste off Government property and dispose of waste in compliance with Federal, State, and local requirements.
 10. Store chemical waste away from the work areas in corrosion resistant containers and dispose of waste in accordance with Federal, State, and local regulations.
 11. Handle discarded materials other than those included in the solid waste category as directed by the COR.
- C. Protection of Water Resources: Keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters and sewer systems. Implement management techniques to control water pollution by the listed construction activities that are included in this contract.
1. Washing and Curing Water: Do not allow wastewater directly derived from construction activities to enter water areas. Collect and place wastewater in retention ponds allowing the suspended material to settle, the pollutants to separate, or the water to evaporate.
 2. Monitor water areas affected by construction.

- D. Protection of Fish and Wildlife Resources: Keep construction activities under surveillance, management, and control to minimize interference with, disturbance of, or damage to fish and wildlife. Prior to beginning construction operations, list species that require specific attention along with measures for their protection.
- E. Protection of Air Resources: Keep construction activities under surveillance, management, and control to minimize pollution of air resources. Burning is not permitted on the job site. Keep activities, equipment, processes, and work operated or performed, in strict accordance with the State of Ohio and Federal emission and performance laws and standards. Maintain ambient air quality standards set by the Environmental Protection Agency, for those construction operations and activities specified.
1. Particulates: Control dust particles, aerosols, and gaseous by-products from all construction activities, processing, and preparation of materials (such as from asphaltic batch plants) at all times, including weekends, holidays, and hours when work is not in progress.
 2. Particulates Control: Maintain all excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and all other work areas within or outside the project boundaries free from particulates which would cause a hazard or a nuisance. Sprinklering, chemical treatment of an approved type, light bituminous treatment, baghouse, scrubbers, electrostatic precipitators, or other methods are permitted to control particulates in the work area.
 3. Hydrocarbons and Carbon Monoxide: Control monoxide emissions from equipment to Federal and State allowable limits.
 4. Odors: Control odors of construction activities and prevent obnoxious odors from occurring.
- F. Reduction of Noise: Minimize noise using every action possible. Perform noise-producing work in less sensitive hours of the day or week as directed by the COR. Maintain noise-produced work at or below the decibel levels and within the time periods specified.
1. Perform construction activities involving repetitive, high-level impact noise only between 8:00 a.m. and 6:00 p.m unless otherwise permitted by local ordinance or the COR. Repetitive impact noise on the property shall not exceed the following dB limitations:

| Time Duration of Impact Noise | Sound Level in dB |
|-------------------------------------|-------------------|
| More than 12 minutes in any hour | 70 |
| Less than 30 seconds of any hour | 85 |
| Less than three minutes of any hour | 80 |
| Less than 12 minutes of any hour | 75 |
 2. Provide sound-deadening devices on equipment and take noise abatement measures that are necessary to comply with the requirements of this contract, consisting of, but not limited to, the following:
 - a. Maintain maximum permissible construction equipment noise levels at 15 m (50 feet) (dBA):

| | | | |
|---------------|----|--------------------|----|
| EARTHMOVING | | MATERIALS HANDLING | |
| FRONT LOADERS | 75 | CONCRETE MIXERS | 75 |
| BACKHOES | 75 | CONCRETE PUMPS | 75 |
| DOZERS | 75 | CRANES | 75 |
| TRACTORS | 75 | DERRICKS IMPACT | 75 |
| SCAPERS | 80 | PILE DRIVERS | 95 |
| GRADERS | 75 | JACK HAMMERS | 75 |
| TRUCKS | 75 | ROCK DRILLS | 80 |
| PAVERS, | 80 | PNEUMATIC TOOLS | 80 |
| STATIONARY | | | |
| PUMPS | 75 | BLASTING | -- |
| GENERATORS | 75 | SAWS | 75 |
| COMPRESSORS | 75 | VIBRATORS | 75 |

- b. Use shields or other physical barriers to restrict noise transmission.
 - c. Provide soundproof housings or enclosures for noise-producing machinery.
 - d. Use efficient silencers on equipment air intakes.
 - e. Use efficient intake and exhaust mufflers on internal combustion engines that are maintained so equipment performs below noise levels specified.
 - f. Line hoppers and storage bins with sound deadening material.
 - g. Conduct truck loading, unloading, and hauling operations so that noise is kept to a minimum.
3. Measure sound level for noise exposure due to the construction at least once every five successive working days while work is being performed above 55 dB(A) noise level. Measure noise exposure at the property line or 15 m (50 feet) from the noise source, whichever is greater. Measure the sound levels on the A weighing network of a General Purpose sound level meter at slow response. To minimize the effect of reflective sound waves at buildings, take measurements at 900 to 1800 mm (three to six feet) in front of any building face. Submit the recorded information to the COR noting any problems and the alternatives for mitigating actions.
- G. Restoration of Damaged Property: If any direct or indirect damage is done to public or private property resulting from any act, omission, neglect, or misconduct, the Contractor shall restore the damaged property to a condition equal to that existing before the damage at no additional cost to the Government. Repair, rebuild, or restore property as directed or make good such damage in an acceptable manner.
- H. Final Clean-up: On completion of project and after removal of all debris, rubbish, and temporary construction, Contractor shall leave the construction area in a clean condition satisfactory to the COR. Cleaning shall include off the station disposal of all items and materials not required to be salvaged, as well as all debris and rubbish resulting from demolition and new work operations.

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SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the requirements for the management of non-hazardous building construction and demolition waste.
- B. Waste disposal in landfills shall be minimized to the greatest extent possible. Of the inevitable waste that is generated, as much of the waste material as economically feasible shall be salvaged, recycled or reused.
- C. Contractor shall use all reasonable means to divert construction and demolition waste from landfills and incinerators, and facilitate their salvage and recycle not limited to the following:
 - 1. Waste Management Plan development and implementation.
 - 2. Techniques to minimize waste generation.
 - 3. Sorting and separating of waste materials.
 - 4. Salvage of existing materials and items for reuse or resale.
 - 5. Recycling of materials that cannot be reused or sold.
- D. At a minimum the following waste categories shall be diverted from landfills:
 - 1. Soil.
 - 2. Inerts (eg, concrete, masonry and asphalt).
 - 3. Clean dimensional wood and palette wood.
 - 4. Green waste (biodegradable landscaping materials).
 - 5. Engineered wood products (plywood, particle board and I-joists, etc).
 - 6. Metal products (eg, steel, wire, beverage containers, copper, etc).
 - 7. Cardboard, paper and packaging.
 - 8. Bitumen roofing materials.
 - 9. Plastics (eg, ABS, PVC).
 - 10. Carpet and/or pad.
 - 11. Gypsum board.
 - 12. Insulation.
 - 13. Paint.
 - 14. Fluorescent lamps.

1.2 RELATED WORK

- A. Section 02 41 00, DEMOLITION.
- B. Section 01 00 00, GENERAL REQUIREMENTS.

1.3 QUALITY ASSURANCE

- A. Contractor shall practice efficient waste management when sizing, cutting and installing building products. Processes shall be employed to ensure the generation of as little waste as possible. Construction /Demolition waste includes products of the following:
 - 1. Excess or unusable construction materials.
 - 2. Packaging used for construction products.
 - 3. Poor planning and/or layout.
 - 4. Construction error.
 - 5. Over ordering.
 - 6. Weather damage.
 - 7. Contamination.
 - 8. Mishandling.
 - 9. Breakage.
- B. Establish and maintain the management of non-hazardous building construction and demolition waste set forth herein. Conduct a site assessment to estimate the types of materials that will be generated by demolition and construction.
- C. Contractor shall develop and implement procedures to recycle construction and demolition waste to a minimum of 50 percent.
- D. Contractor shall be responsible for implementation of any special programs involving rebates or similar incentives related to recycling. Any revenues or savings obtained from salvage or recycling shall accrue to the contractor.
- E. Contractor shall provide all demolition, removal and legal disposal of materials. Contractor shall ensure that facilities used for recycling, reuse and disposal shall be permitted for the intended use to the extent required by local, state, federal regulations. The Whole Building Design Guide website <http://www.wbdg.org/tools/cwm.php> provides a Construction Waste Management Database that contains information on companies that haul, collect, and process recyclable debris from construction projects.
- F. Contractor shall assign a specific area to facilitate separation of materials for reuse, salvage, recycling, and return. Such areas are to be kept neat and clean and clearly marked in order to avoid contamination or mixing of materials.
- G. Contractor shall provide on-site instructions and supervision of separation, handling, salvaging, recycling, reuse and return methods to be used by all parties during waste generating stages.
- H. Record on daily reports any problems in complying with laws, regulations and ordinances with corrective action taken.

1.4 TERMINOLOGY

- A. Class III Landfill: A landfill that accepts non-hazardous resources such as household, commercial and industrial waste resulting from construction, remodeling, repair and demolition operations.

- B. Clean: Untreated and unpainted; uncontaminated with adhesives, oils, solvents, mastics and like products.
- C. Construction and Demolition Waste: Includes all non-hazardous resources resulting from construction, remodeling, alterations, repair and demolition operations.
- D. Dismantle: The process of parting out a building in such a way as to preserve the usefulness of its materials and components.
- E. Disposal: Acceptance of solid wastes at a legally operating facility for the purpose of land filling (includes Class III landfills and inert fills).
- F. Inert Backfill Site: A location, other than inert fill or other disposal facility, to which inert materials are taken for the purpose of filling an excavation, shoring or other soil engineering operation.
- G. Inert Fill: A facility that can legally accept inert waste, such as asphalt and concrete exclusively for the purpose of disposal.
- H. Inert Solids/Inert Waste: Non-liquid solid resources including, but not limited to, soil and concrete that does not contain hazardous waste or soluble pollutants at concentrations in excess of water-quality objectives established by a regional water board, and does not contain significant quantities of decomposable solid resources.
- I. Mixed Debris: Loads that include commingled recyclable and non-recyclable materials generated at the construction site.
- J. Mixed Debris Recycling Facility: A solid resource processing facility that accepts loads of mixed construction and demolition debris for the purpose of recovering re-usable and recyclable materials and disposing non-recyclable materials.
- K. Permitted Waste Hauler: A company that holds a valid permit to collect and transport solid wastes from individuals or businesses for the purpose of recycling or disposal.
- L. Recycling: The process of sorting, cleansing, treating, and reconstituting materials for the purpose of using the altered form in the manufacture of a new product. Recycling does not include burning, incinerating or thermally destroying solid waste.
 - 1. On-site Recycling - Materials that are sorted and processed on site for use in an altered state in the work, i.e. concrete crushed for use as a sub-base in paving.
 - 2. Off-site Recycling - Materials hauled to a location and used in an altered form in the manufacture of new products.
- M. Recycling Facility: An operation that can legally accept materials for the purpose of processing the materials into an altered form for the manufacture of new products. Depending on the types of materials accepted and operating procedures, a recycling facility may or may not be required to have a solid waste facilities permit or be regulated by the local enforcement agency.
- N. Reuse: Materials that are recovered for use in the same form, on-site or off-site.
- O. Return: To give back reusable items or unused products to vendors for credit.

- P. Salvage: To remove waste materials from the site for resale or re-use by a third party.
- Q. Source-Separated Materials: Materials that are sorted by type at the site for the purpose of reuse and recycling.
- R. Solid Waste: Materials that have been designated as non-recyclable and are discarded for the purposes of disposal.
- S. Transfer Station: A facility that can legally accept solid waste for the purpose of temporarily storing the materials for re-loading onto other trucks and transporting them to a landfill for disposal, or recovering some materials for re-use or recycling.

1.5 SUBMITTALS

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES, furnish the following:
- B. Prepare and submit to the COR a written demolition debris management plan. The plan shall include, but not be limited to, the following information:
 - 1. Procedures to be used for debris management.
 - 2. Techniques to be used to minimize waste generation.
 - 3. Analysis of the estimated job site waste to be generated:
 - a. List of each material and quantity to be salvaged, reused, recycled.
 - b. List of each material and quantity proposed to be taken to a landfill.
 - 4. Detailed description of the Means/Methods to be used for material handling.
 - a. On site: Material separation, storage, protection where applicable.
 - b. Off site: Transportation means and destination. Include list of materials.
 - 1) Description of materials to be site-separated and self-hauled to designated facilities.
 - 2) Description of mixed materials to be collected by designated waste haulers and removed from the site.
 - c. The names and locations of mixed debris reuse and recycling facilities or sites.
 - d. The names and locations of trash disposal landfill facilities or sites.
 - e. Documentation that the facilities or sites are approved to receive the materials.
- C. Designated Manager responsible for instructing personnel, supervising, documenting and administer over meetings relevant to the Waste Management Plan.
- D. Monthly summary of construction and demolition debris diversion and disposal, quantifying all materials generated at the work site and disposed of or diverted from disposal through recycling.

1.6 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced by the basic designation only. In the event that criteria requirements conflict, the most stringent requirements shall be met.
- B. U.S. Green Building Council (USGBC):
 - 1. LEED Green Building Rating System for New Construction

1.7 RECORDS

- A. Maintain records to document the quantity of waste generated; the quantity of waste diverted through sale, reuse, or recycling; and the quantity of waste disposed by landfill or incineration.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. List of each material and quantity to be salvaged, recycled, reused.
- B. List of each material and quantity proposed to be taken to a landfill.
- C. Material tracking data: Receiving parties, dates removed, transportation costs, weight tickets, tipping fees, manifests, invoices, net total costs or savings.

PART 3 - EXECUTION

3.1 COLLECTION

- A. Provide all necessary containers, bins and storage areas to facilitate effective waste management.
- B. Clearly identify containers, bins and storage areas so that recyclable materials are separated from trash and can be transported to respective recycling facility for processing.
- C. Hazardous wastes shall be separated, stored, disposed of according to local, state, federal regulations.

3.2 DISPOSAL

- A. Contractor shall be responsible for transporting and disposing of materials that cannot be delivered to a source-separated or mixed materials recycling facility to a transfer station or disposal facility that can accept the materials in accordance with state and federal regulations.
- B. Construction or demolition materials with no practical reuse or that cannot be salvaged or recycled shall be disposed of at a landfill or incinerator.

3.3 REPORT

- A. With each application for progress payment, submit a summary of construction and demolition debris diversion and disposal including beginning and ending dates of period covered.

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PROJECT #:541-17-212

- B. Quantify all materials diverted from landfill disposal through salvage or recycling during the period with the receiving parties, dates removed, transportation costs, weight tickets, manifests, invoices. Include the net total costs or savings for each salvaged or recycled material.
- C. Quantify all materials disposed of during the period with the receiving parties, dates removed, transportation costs, weight tickets, tipping fees, manifests, invoices. Include the net total costs for each disposal.

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**SECTION 02 41 00
DEMOLITION**

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies demolition and removal of utilities, other site improvements and debris as shown on Drawings.

1.2 RELATED WORK:

- A. Demolition and removal of walks and plant materials: Section 31 20 11, EARTH MOVING.
- B. Disconnecting utility services prior to demolition: Section 01 00 00, GENERAL REQUIREMENTS.
- C. Reserved items that are to remain the property of the Government: Section 01 00 00, GENERAL REQUIREMENTS.
- D. Infectious Control: Section 01 00 00, GENERAL REQUIREMENTS, Article 1.7, INFECTION PREVENTION MEASURES.

1.3 PROTECTION:

- A. Perform demolition in such manner as to eliminate hazards to persons and property; to minimize interference with use of adjacent areas, utilities and structures or interruption of use of such utilities; and to provide free passage to and from such adjacent areas of structures.
- B. Provide safeguards, including warning signs, barricades, temporary fences, warning lights, and other similar items that are required for protection of all personnel during demolition and removal operations. Comply with requirements of Section 01 00 00, GENERAL REQUIREMENTS, Article 1.9 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES AND IMPROVEMENTS.
- C. Maintain fences, barricades, lights, and other similar items around exposed excavations until such excavations have been completely filled.
- D. Prevent spread of flying particles and dust. Sprinkle rubbish and debris with water to keep dust to a minimum. Do not use water if it results in hazardous or objectionable condition such as, but not limited to; ice, flooding, or pollution.
- E. In addition to previously listed fire and safety rules to be observed in performance of work, include following:
 - 1. Keep hydrants clear and accessible at all times. Prohibit debris from accumulating within a radius of 4500 mm (15 feet) of fire hydrants.

F. Before beginning any demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work. The contractor shall take necessary precautions to avoid damages to existing items to remain in place, to be reused, or to remain the property of the Medical Center any damaged items shall be repaired or replaced as approved by the COR. The Contractor shall coordinate the work of this section with all other work and shall construct and maintain shoring, bracing, and supports as required. The Contractor shall ensure that structural elements are not overloaded and shall be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under this contract. Do not overload structural elements. Provide new supports and reinforcement for existing construction weakened by demolition or removal works. Repairs, reinforcement, or structural replacement must have COR's approval.

1.4 UTILITY SERVICES:

- A. Demolish and remove outside utility service lines shown to be removed.
- B. Remove abandoned outside utility lines that would interfere with installation of new utility lines and new construction.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 DEMOLITION:

- A. Completely demolish and remove site improvements, including all appurtenances related or connected thereto, as noted below:
 - 1. As required for installation of new utility service lines.
 - 2. To full depth within an area defined by hypothetical lines located 1500 mm (5 feet) outside building lines of new structures.
- B. Debris, including brick, concrete, stone, metals and similar materials shall become property of Contractor and shall be disposed of by him daily, off the Medical Center to avoid accumulation at the demolition site. Materials that cannot be removed daily shall be stored in areas specified by the COR. Break up concrete slabs below grade that do not require removal from present location into pieces not exceeding 600 mm (24 inches) square to permit drainage. Contractor shall dispose debris

in compliance with applicable federal, state or local permits, rules and/or regulations.

- C. Remove and legally dispose of all materials, other than earth to remain as part of project work. Materials removed shall become property of contractor and shall be disposed of in compliance with applicable federal, state or local permits, rules and/or regulations. Materials that are located beneath the surface of the surrounding ground more than 1500 mm (5 feet), or materials that are discovered to be hazardous, shall be handled as unforeseen. The removal of hazardous material shall be referred to Hazardous Materials specifications.
- D. Remove existing utilities as indicated or uncovered by work and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the COR. When Utility lines are encountered that are not indicated on the drawings, the COR shall be notified prior to further work in that area.

3.2 CLEAN-UP:

On completion of work of this section and after removal of all debris, leave site in clean condition satisfactory to COR. Clean-up shall include off the Medical Center disposal of all items and materials not required to remain property of the Government as well as all debris and rubbish resulting from demolition operations.

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**SECTION 03 30 00
CAST-IN-PLACE CONCRETE**

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies cast-in-place structural concrete and materials and mixes for other concrete.

1.2 RELATED WORK:

- A. Materials testing and inspection during construction: Section 01 45 29, TESTING LABORATORY SERVICES.
- B. Concrete roads, walks, and similar exterior site work: Section 32 05 23, CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS.

1.3 TESTING AGENCY FOR CONCRETE MIX DESIGN:

- A. Testing agency retained and reimbursed by the Contractor and approved by COR.
- B. Testing agency maintaining active participation in Program of Cement and Concrete Reference Laboratory (CCRL) of National Institute of Standards and Technology.
- C. Testing agency shall furnish equipment and qualified technicians to establish proportions of ingredients for concrete mixes.

1.4 TOLERANCES:

- A. Formwork: ACI 117, except the elevation tolerance of formed surfaces before removal of shores is +0 mm (+0 inch) and -20 mm (-3/4 inch).
- B. Reinforcement Fabricating and Placing: ACI 117, except that fabrication tolerance for bar sizes Nos. 10, 13, and 16 (Nos. 3, 4, and 5) (Tolerance Symbol 1 in Fig. 2.1(a), ACI, 117) used as column ties or stirrups is +0 mm (+0 inch) and -13 mm (-1/2 inch) where gross bar length is less than 3600 mm (12 feet), or +0 mm (+0 inch) and -20 mm (-3/4 inch) where gross bar length is 3600 mm (12 feet) or more.
- C. Cross-Sectional Dimension: ACI 117, except tolerance for thickness of slabs 12 inches or less is +20 mm (+3/4 inch) and - 6 mm (-1/4 inch). Tolerance of thickness of beams more than 300 mm (12 inch) but less than 900 mm (3 feet) is +20 mm (+3/4 inch) and -10 mm (-3/8 inch).

1.5 REGULATORY REQUIREMENTS:

- A. ACI 315 - Details and Detailing of Concrete Reinforcement.
- B. ACI 318 - Building Code Requirements for Reinforced Concrete.
- C. ACI 301 - Standard Specifications for Structural Concrete.

1.6 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Mill Test Reports:
 - Reinforcing steel.
 - Cement.
- C. Manufacturer's Certificates:
 - Abrasive aggregate.
 - Lightweight aggregate for structural concrete.
 - Air-entraining admixture.
 - Chemical admixtures, including chloride ion content.
 - Liquid membrane-forming compounds for curing concrete.
 - Expansion joint filler.
- D. Testing Agency for Concrete Mix Design: Approval request including qualifications of principals and technicians and evidence of active participation in program of Cement and Concrete Reference Laboratory (CCRL) of National Institute of Standards and Technology.
- G. Test Report for Concrete Mix Designs: Trial mixes including water-cement ratio curves, concrete mix ingredients, and admixtures.

1.7 PRE-CONCRETE CONFERENCE:

- A. General: At least 15 days prior to submittal of design mixes, conduct a meeting to review proposed methods of concrete construction to achieve the required results.
- B. Agenda: Includes but is not limited to:
 - 1. Submittals.
 - 2. Coordination of work.
 - 3. Availability of material.
 - 4. Concrete mix design including admixtures.
 - 5. Methods of placing, finishing, and curing.
 - 6. Finish criteria required to obtain required flatness and levelness.
 - 7. Timing of floor finish measurements.
 - 8. Material inspection and testing.
- C. Attendees: Include but not limited to representatives of Contractor; subcontractors involved in supplying, conveying, placing, finishing, and curing concrete; COR.
- D. Minutes of the meeting: Contractor shall take minutes and type and distribute the minutes to attendees within five days of the meeting.

1.8 MOCK-UP:

- A. In addition to the other specified samples and tests, construct a mock-up using the materials, reinforcing, forming system and construction methods proposed for use in 32 05 23 Decorative Concrete.
- B. Construct the mock-up with at least 8 feet by 8 feet exposed surface and suitable foundations. Include the following where applicable: Control joints, reglets, recesses or other typical architectural details.
- C. Perform the surface treatments and finishes as proposed for decorative concrete to establish the texture of finish required by the Architect. Repeat as required until a sample satisfactory to the Architect has been obtained.
- D. The completed mock-up shall be inspected by the Architect. Failure of the mock-up to match the approved sample will require the construction of further mock-ups until approval is obtained. Remove rejected mock-ups immediately.
- E. Maintain the approved mock-ups in good condition at the job site until all architectural concrete surfaces have been completed and approved by the Architect. Remove the mock-up from the site after completion of the above.

1.9 APPLICABLE PUBLICATIONS:

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Concrete Institute (ACI):
 - 117-06.....Tolerances for Concrete Construction and Materials
 - 117R-90.....Tolerances for Concrete Construction and Materials
 - 211.1-02.....Selecting Proportions for Normal, Heavyweight, and Mass Concrete
 - 214R-02.....Evaluation of Strength Test Results of Concrete
 - 304R-2000.....Guide for Measuring, Mixing, Transporting, and Placing Concrete
 - 305R-06.....Hot Weather Concreting
 - 306R-(R2002).....Cold Weather Concreting
 - 308 -(R1997).....Standard Practice for Curing Concrete
 - 309R-05.....Guide for Consolidation of Concrete

- 318/318R-05.....Building Code Requirements for Reinforced
Concrete and Commentary
- 347R- 04.....Guide to Formwork for Concrete
- C. American National Standards Institute and American Hardboard Association
(ANSI/AHA):
- A135.4-95.....Basic Hardboard
- D. American Society for Testing and Materials (ASTM):
- A82-05.....Steel Wire, Plain, for Concrete Reinforcement
- A185-06.....Steel Welded Wire Fabric, Plain, for Concrete
Reinforcement
- C31/C31M-06.....Making and Curing Concrete Test Specimens in the
field
- C33-03.....Concrete Aggregates
- C39/C39M-05.....Compressive Strength of Cylindrical Concrete
Specimens
- C94/C94M-07.....Ready-Mixed Concrete
- C143/C143M-05.....Slump of Hydraulic Cement Concrete
- C150-07.....Portland Cement
- C172-04.....Sampling Freshly Mixed Concrete
- C173-07.....Air Content of Freshly Mixed Concrete by the
Volumetric Method
- C192/C192M-06.....Making and Curing Concrete Test Specimens in the
Laboratory
- C231-04.....Air Content of Freshly Mixed Concrete by the
Pressure Method
- C260-06.....Air-Entraining Admixtures for Concrete
- C309-07.....Liquid Membrane-Forming Compounds for Curing
Concrete
- C494/C494M-05.....Chemical Admixtures for Concrete
- C496-06.....Splitting Tensile Strength of Cylindrical
Concrete Specimens
- C666-03.....Resistance of Concrete to Rapid Freezing and
Thawing
- C881-02.....Epoxy-Resin-Base Bonding Systems for Concrete
- D297-93(R2006).....Rubber Products-Chemical Analysis
- D1751-04.....Preformed Expansion Joint Filler for Concrete
Paving and Structural Construction (Non-
extruding and Resilient Bituminous Types)

D4397-02.....Polyethylene Sheeting for Construction,
Industrial and Agricultural Applications

- E. Concrete Reinforcing Steel Institute (CRSI):
Manual of Standard Practice 27th Edition
- F. U. S. Department of Commerce Product Standard (PS):
PS 1.....Construction and Industrial Plywood
PS 20.....American Softwood Lumber

PART 2 - PRODUCTS:

2.1 FORMS:

- A. Wood: PS 20 free from loose knots and suitable to facilitate finishing concrete surface specified; tongue and grooved.
- B. Plywood: PS-1 Exterior Grade B-B (concrete-form) 3/4 inch thick for unlined contact form. B-B High Density Concrete Form Overlay optional.
- C. Metal for Concrete Rib-Type Construction: Steel (removal type) of suitable weight and form to provide required rigidity.
- D. Permanent Steel Form for Concrete Slabs: Corrugated, ASTM A653, Grade E, and Galvanized, ASTM A653, G90. Provide venting where insulating concrete fill is used.
- E. Corrugated Fiberboard Void Boxes: Double faced, completely impregnated with paraffin and laminated with moisture resistant adhesive, size as shown. Design forms to support not less than 48 kPa (1000 psf) and not lose more than 15 percent of their original strength after being completely submerged in water for 24 hours and then air dried.

2.2 MATERIALS:

- A. Portland Cement: ASTM C150 Type I or II.
- B. Coarse Aggregate: Crushed Limestone ASTM C33.
- C. Fine Aggregate: Crushed Limestone ASTM C33.
- D. Mixing Water: Fresh, clean, and potable.
- E. Admixtures:
 - 1. Water Reducing Admixture: ASTM C494, Type A and not contain more chloride ions than are present in municipal drinking water.
 - 2. Water Reducing, Retarding Admixture: ASTM C494, Type D and not contain more chloride ions than are present in municipal drinking water.
 - 3. High-Range Water-Reducing Admixture (Superplasticizer): ASTM C494, Type F or G, and not contain more chloride ions than are present in municipal drinking water.

4. Non-Corrosive, Non-Chloride Accelerator: ASTM C494, Type C or E, and not contain more chloride ions than are present in municipal drinking water. Admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory of at least one year duration using an acceptable accelerated corrosion test method such as that using electrical potential measures.
5. Air Entraining Admixture: ASTM C260.
6. Prohibited Admixtures: Calcium chloride, thiocyanate or admixtures containing more than 0.05 percent chloride ions are not permitted.
9. Certification: Written conformance to the requirements above and the chloride ion content of the admixture prior to mix design review.
- F. Vapor Barrier: ASTM D4397, 0.25 mm (10 mil).
- G. Reinforcing Steel: ASTM A615, or ASTM A996, deformed, grade as shown.
- H. Welded Wire Fabric: ASTM A185.
- I. Cold Drawn Steel Wire: ASTM A82
- J. Supports, Spacers, and Chairs: Types which will hold reinforcement in position shown in accordance with requirements of ACI 318 except as specified.
- K. Expansion Joint Filler: ASTM D1751.
- L. Liquid Membrane-forming Compounds for Curing Concrete: ASTM C309, Type I, with fugitive dye. Compound shall be compatible with scheduled decorative additives and surface treatment and shall not discolor concrete surface.
- M. Penetrating Sealer: High penetration silane sealer providing minimum 95 percent screening per National Cooperative Highway Research Program (NCHRP) No. 244 standards for chloride ion penetration resistance. Requires moist (non-membrane) curing of slab.

2.3 CONCRETE MIXES:

- A. Mix Designs: Proportioned in accordance with Section 5.3, "Proportioning on the Basis of Trial Mixtures" of ACI 318.
 1. If trial mixes are used, make a set of at least 6 cylinders in accordance with ASTM C192 for test purposes from each trial mix; test three for compressive strength at 7 days and three at 28 days.
 2. Submit a report of results of each test series, include a detailed listing of the proportions of trial mix or mixes, including cement, admixtures, weight of fine and coarse aggregate per cubic yard measured dry rodded and damp loose, specific gravity, fineness modulus, percentage of moisture, air content, water-cement ratio, and consistency of each cylinder in terms of slump.

3. Prepare a curve showing relationship between water-cement ratio at 7-day and 28-day compressive strengths. Plot each curve using at least three specimens.
- B. After approval of mixes no substitution in material or change in proportions of approval mixes may be made without additional tests and approval of COR or as specified. Making and testing of preliminary test cylinders may be carried on pending approval of cement, providing Contractor and manufacturer certify that ingredients used in making test cylinders are the same. COR may allow Contractor to proceed with depositing concrete for certain portions of work, pending final approval of cement and approval of design mix.
- D. Cement Factor: Maintain minimum cement factors in Table I.

TABLE I - CEMENT AND WATER FACTORS FOR CONCRETE

| Concrete Strength | | Air-Entrained | |
|----------------------------------|--------------------------|--------------------------|-------------------------------|
| Min. 28 Day Comp. Str. psi | Min. Cement lbs/c. yd | Min. Cement lbs/c. yd | Max. Water Cement Ratio |
| 4000 | 600 | 600 | 0.50 |

Determined by Laboratory in accordance with ACI 211.1 for normal concrete.

- E. Aggregate: Maintain minimum aggregate factors of Table II.

TABLE II - AGGREGATE FACTORS FOR CONCRETE

| Coarse | Fine |
|-----------|-----------|
| lbs/c. yd | lbs/c. yd |
| 1285 | 1630 |

- F. Maximum Slump: Maximum slump, as determined by ASTM C143 with tolerances as established by ASTM C94, for concrete to be vibrated shall be as required in Section 32 05 23.
- G. Air-Entrainment: Air-entrainment of normal weight concrete shall be 6+/- 2%. Determine air content by either ASTM C173 or ASTM C231.
- H. High early strength concrete, made with Type III cement or Type I cement plus non-corrosive accelerator, shall have a 7-day compressive strength equal to specified minimum 28-day compressive strength for concrete type specified made with standard Portland cement.
- I. Concrete slabs placed at air temperatures below 50 degrees Fahrenheit use non-corrosive, non-chloride accelerator. Concrete required to be air

entrained use approved air entraining admixture. Pumped concrete, synthetic fiber concrete, architectural concrete, concrete required to be watertight, and concrete with a water/cement ratio below 0.50 use high-range water-reducing admixture (superplasticizer).

- J. Durability: Use air entrainment for exterior exposed concrete subjected to freezing and thawing and other concrete shown or specified. Air content as shown in Table III or Table IV.
- K. Enforcing Strength Requirements: Test as specified in Section 01 45 29, TESTING LABORATORY SERVICES, during the progress of the work. Seven-day tests may be used as indicators of 28-day strength. Average of any three 28-day consecutive strength tests of laboratory-cured specimens representing each type of concrete shall be equal to or greater than specified strength. No single test shall be more than 3.5 MPa (500 psi) below specified strength. Interpret field test results in accordance with ACI 214. Should strengths shown by test specimens fall below required values, COR may require any one or any combination of the following corrective actions, at no additional cost to the Government:
1. Require changes in mix proportions by selecting one of the other appropriate trial mixes or changing proportions, including cement content, of approved trial mix.
 2. Require additional curing and protection.
 3. If five consecutive tests fall below 95 percent of minimum values given in Table I or if test results are so low as to raise a question as to the safety of the structure, COR may direct Contractor to take cores from portions of the structure. Use results from cores tested by the Contractor retained testing agency to analyze structure.
 4. If strength of core drilled specimens falls below 85 percent of minimum value given in Table I, COR may order load tests, made by Contractor retained testing agency, on portions of building so affected. Load tests in accordance with ACI 318 and criteria of acceptability of concrete under test as given therein.
 5. Concrete work, judged inadequate by structural analysis, by results of load test, or for any reason, shall be reinforced with additional construction or replaced, if directed by the COR.

2.4 BATCHING AND MIXING:

- A. General: Concrete shall be "Ready-Mixed" and comply with ACI 318 and ASTM C94, except as specified. Batch mixing at the site is permitted. Mixing process and equipment must be approved by COR. With each batch of

concrete, furnish certified delivery tickets listing information in Paragraph 16.1 and 16.2 of ASTM C94. Maximum delivery temperature of concrete is 100 degrees Fahrenheit. Minimum delivery temperature as follows:

| Atmospheric Temperature | Minimum Concrete Temperature |
|----------------------------|------------------------------|
| 30 degrees to 40 degrees F | 60 degrees F |
| 0 degrees to 30 degrees F | 70 degrees F |

PART 3 - EXECUTION

3.1 FORMWORK:

- A. General: Design in accordance with ACI 347 is the responsibility of the Contractor. The Contractor shall retain a registered Professional Engineer to design the formwork, shores, and reshores.
 - 1. Form boards and plywood forms may be reused for contact surfaces of exposed concrete only if thoroughly cleaned, patched, and repaired and COR approves their reuse.
 - 2. Provide forms for concrete footings unless COR determines forms are not necessary.
 - 3. Corrugated fiberboard forms: Place forms on a smooth firm bed, set tight, with no buckled cartons to prevent horizontal displacement, and in a dry condition when concrete is placed.
- B. Treating and Wetting: Treat or wet contact forms as follows:
 - 1. Coat plywood and board forms with non-staining form sealer. In hot weather, cool forms by wetting with cool water just before concrete is placed.
 - 2. Clean and coat removable metal forms with light form oil before reinforcement is placed. In hot weather, cool metal forms by thoroughly wetting with water just before placing concrete.
 - 3. Use sealer on reused plywood forms as specified for new material.
- C. Size and Spacing of Studs: Size and space studs, wales and other framing members for wall forms so as not to exceed safe working stress of kind of lumber used nor to develop deflection greater than 1/270 of free span of member.
- D. Unlined Forms: Use plywood forms to obtain a smooth finish for concrete surfaces. Tightly butt edges of sheets to prevent leakage. Back up all vertical joints solidly and nail edges of adjacent sheets to same stud with 6d box nails spaced not over 6 inches apart.

- E. Lined Forms: May be used in lieu of unlined plywood forms. Back up form lining solidly with square edge board lumber securely nailed to studs with all edges in close contact to prevent bulging of lining. No joints in lining and backing may coincide. Nail abutted edges of sheets to same backing board. Nail lining at not over 8 inches on center along edges and with at least one nail to each square foot of surface area; nails to be 3d blued shingle or similar nails with thin flatheads.
- F. Inserts, sleeves and other items specified as furnished under this and other sections of specifications and required to be in their final position at time concrete is placed shall be properly located, accurately positioned, and built into construction, and maintained securely in place.
1. Install sleeves, inserts and similar items for mechanical services in accordance with drawings prepared specially for mechanical services. Contractor is responsible for accuracy and completeness of drawings and shall coordinate requirements for mechanical services and equipment.
 2. Minimum clear distance of embedded items such as conduit and pipe is at least three times diameter of conduit or pipe, except at stub-ups and other similar locations.
- G. Construction Tolerances:
1. Set and maintain concrete formwork to assure erection of completed work within tolerances specified and to accommodate installation of other rough and finish materials. Accomplish remedial work necessary for correcting excessive tolerances. Erected work that exceeds specified tolerance limits shall be remedied or removed and replaced, at no additional cost to the Government.
 2. Permissible surface irregularities for various classes of materials are defined as "finishes" in specification sections covering individual materials. They are to be distinguished from tolerances specified which are applicable to surface irregularities of structural elements.

3.2 PLACING REINFORCEMENT:

- A. General: Details of concrete reinforcement in accordance with ACI 318 and ACI 315, unless otherwise shown.
- B. Placing: Place reinforcement conforming to CRSI DA4, unless otherwise shown.

1. Lap welded wire fabric at least 1/2 mesh panels plus end extension of wires not less than 6 inches in slabs on grade.

3.3 CONSTRUCTION JOINTS:

- A. Unless otherwise shown, location of construction joints to limit individual placement shall not exceed 80 feet in any horizontal direction, except slabs on grade which shall have construction joints shown. Allow 48 hours to elapse between pouring adjacent sections unless this requirement is waived by COR.

3.4 EXPANSION JOINTS:

- A. Clean expansion joint surfaces before installing premolded filler and placing adjacent concrete.

3.5 PLACING CONCRETE:

- A. Preparation:
 1. Remove hardened concrete, wood chips, shavings and other debris from forms.
 2. Remove hardened concrete and foreign materials from interior surfaces of mixing and conveying equipment.
 3. Have forms and reinforcement inspected and approved by COR before depositing concrete.
 4. Provide runways for wheeling equipment to convey concrete to point of deposit. Keep equipment on runways which are not supported by or bear on reinforcement. Provide similar runways for protection of vapor barrier on coarse fill.
- B. Bonding: Before depositing new concrete on or against concrete which has been set, thoroughly roughen and clean existing surfaces of laitance, foreign matter, and loose particles.
 1. Preparing surface for applied topping:
 - a. Remove laitance, mortar, oil, grease, paint, or other foreign material by sand blasting. Clean with vacuum type equipment to remove sand and other loose material.
 - b. Broom clean and keep base slab wet for at least four hours before topping is applied.
 - c. Use a thin coat of one part Portland cement, 1.5 parts fine sand, bonding admixture; and water at a 50: 50 ratio and mix to achieve the consistency of thick paint. Apply to a damp base slab by scrubbing with a stiff fiber brush. New concrete shall be placed while the bonding grout is still tacky.

- C. Conveying Concrete: Convey concrete from mixer to final place of deposit by a method which will prevent segregation. Method of conveying concrete subject to approval of COR.
- D. Placing: For special requirements see Paragraphs, HOT WEATHER and COLD WEATHER.
1. Do not place concrete when weather conditions prevent proper placement and consolidation, or when concrete has attained its initial set, or has contained its water or cement content more than 1 1/2 hours.
 2. Deposit concrete in forms as near as practicable in its final position. Prevent splashing of forms or reinforcement with concrete in advance of placing concrete.
 3. Do not drop concrete freely more than 10 feet for concrete containing the high-range water-reducing admixture (superplasticizer) or 5 feet for conventional concrete. Where greater drops are required, use a tremie or flexible spout (canvas elephant trunk), attached to a suitable hopper.
 4. Continuously place concrete until an entire unit between construction joints is placed. Rate and method of placing concrete shall be such that no concrete between construction joints will be deposited upon or against partly set concrete, after it's initial set has taken place, or after 45 minutes of elapsed time during concrete placement.
- E. Consolidation: Conform to ACI 309. Immediately after depositing, spade concrete next to forms, work around reinforcement and into angles of forms, tamp lightly by hand, and compact with mechanical vibrator applied directly into concrete at approximately 18 inch intervals. Mechanical vibrator shall be power driven, hand operated type with minimum frequency of 5000 cycles per minute having an intensity sufficient to cause flow or settlement of concrete into place. Vibrate concrete to produce thorough compaction, complete embedment of reinforcement and concrete of uniform and maximum density without segregation of mix. Do not transport concrete in forms by vibration.
1. Use of form vibration shall be approved only when concrete sections are too thin or too inaccessible for use of internal vibration.
 2. Carry on vibration continuously with placing of concrete. Do not insert vibrator into concrete that has begun to set.

3.6 HOT WEATHER:

Follow the recommendations of ACI 305 or as specified to prevent problems in the manufacturing, placing, and curing of concrete that can adversely affect the properties and serviceability of the hardened concrete. Methods proposed for cooling materials and arrangements for protecting concrete shall be made in advance of concrete placement and approved by COR.

3.7 COLD WEATHER:

Follow the recommendations of ACI 306 or as specified to prevent freezing of concrete and to permit concrete to gain strength properly. Use only the specified non-corrosive, non-chloride accelerator. Do not use calcium chloride, thiocyanates or admixtures containing more than 0.05 percent chloride ions. Methods proposed for heating materials and arrangements for protecting concrete shall be made in advance of concrete placement and approved by COR.

3.8 PROTECTION AND CURING:

A. Conform to ACI 308: Initial curing shall immediately follow the finishing operation. Protect exposed surfaces of concrete from premature drying, wash by rain and running water, wind, mechanical injury, and excessively hot or cold temperatures. Keep concrete not covered with membrane or other curing material continuously wet for at least 7 days after placing, except wet curing period for high-early-strength concrete shall be not less than 3 days. Keep wood forms continuously wet to prevent moisture loss until forms are removed. Cure exposed concrete surfaces as described below. Other curing methods may be used if approved by COR.

1. Liquid curing and sealing compounds: Apply by power-driven spray or roller in accordance with the manufacturer's instructions. Apply immediately after finishing. Maximum coverage 300 square feet per gallon on floated or broomed surfaces for the curing/sealing compound.

3.9 REMOVAL OF FORMS:

A. Remove in a manner to assure complete safety of structure after the following conditions have been met.

1. Where structure as a whole is supported on shores, forms for beams and girder sides, columns, and similar vertical structural members may be removed after 24 hours, provided concrete has hardened

- sufficiently to prevent surface damage and curing is continued without any lapse in time as specified for exposed surfaces.
2. Take particular care in removing forms of architectural exposed concrete to insure surfaces are not marred or gouged, and that corners and arises are true, sharp and unbroken.
- B. Control Test: Use to determine if the concrete has attained sufficient strength and curing to permit removal of supporting forms. Cylinders required for control tests taken in accordance with ASTM C172, molded in accordance with ASTM C31, and tested in accordance with ASTM C39. Control cylinders cured and protected in the same manner as the structure they represent. Supporting forms or shoring not removed until strength of control test cylinders have attained at least 70 percent of minimum 28-day compressive strength specified. Exercise care to assure that newly unsupported portions of structure are not subjected to heavy construction or material loading.

3.10 CONCRETE FINISHES:

- A. Slab Finishes:
1. Monitoring and Adjustment: Provide continuous cycle of placement, measurement, evaluation and adjustment of procedures to produce slabs within specified tolerances.
 2. Set perimeter forms to serve as screed using either optical or laser instruments. For slabs on grade, wet screeds may be used to establish initial grade during strike-off, unless COR determines that the method is proving insufficient to meet required finish tolerances and directs use of rigid screed guides. Where wet screeds are allowed, they shall be placed using grade stakes set by optical or laser instruments. Use rigid screed guides, as opposed to wet screeds, to control strike-off elevation for all types of elevated (non slab-on-grade) slabs. Divide bays into halves or thirds by hard screeds. Adjust as necessary where monitoring of previous placements indicates unshored structural steel deflections to other than a level profile.
 3. Place slabs monolithically. Once slab placement commences, complete finishing operations within same day.
 4. Use straightedges specifically made for screeding, such as hollow magnesium straightedges or power strike-offs. Do not use pieces of dimensioned lumber. Strike off and screed slab to a true surface at required elevations. Use optical or laser instruments to check concrete finished surface grade after strike-off. Repeat strike-off

- as necessary. Complete screeding before any excess moisture or bleeding water is present on surface. Do not sprinkle dry cement on the surface.
5. Immediately following screeding, and before any bleed water appears, use a 10 foot wide highway straightedge in a cutting and filling operation to achieve surface flatness. Do not use bull floats or darbys, except that darbying may be allowed for narrow slabs and restricted spaces.
 6. Wait until water sheen disappears and surface stiffens before proceeding further. Do not perform subsequent operations until concrete will sustain foot pressure with maximum of 1/4 inch indentation.
 7. Broom Finish: Finish exterior slabs, ramps, and stair treads with a bristle brush moistened with clear water after surfaces have been floated. Brush in a direction transverse to main traffic. Match texture approved by COR from sample panel.

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**SECTION 07 84 00
FIRESTOPPING**

PART 1 GENERAL

1.1 DESCRIPTION

- A. Closures of openings in walls, floors, and roof decks against penetration of flame, heat, and smoke or gases in fire resistant rated construction.
- B. Closure of openings in walls against penetration of gases or smoke in smoke partitions.

1.2 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturers literature, data, and installation instructions for types of firestopping and smoke stopping used.
- C. List of FM, UL, or WH classification number of systems installed.
- D. Certified laboratory test reports for ASTM E814 tests for systems not listed by FM, UL, or WH proposed for use.

1.3 DELIVERY AND STORAGE

- A. Deliver materials in their original unopened containers with manufacturer's name and product identification.
- B. Store in a location providing protection from damage and exposure to the elements.

1.4 WARRANTY

Firestopping work subject to the terms of the Article "Warranty of Construction", FAR clause 52.246-21, except extend the warranty period to five years.

1.5 QUALITY ASSURANCE

FM, UL, or WH or other approved laboratory tested products will be acceptable.

1.6 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - E84-10.....Surface Burning Characteristics of Building Materials
 - E814-11.....Fire Tests of Through-Penetration Fire Stops

- C. Factory Mutual Engineering and Research Corporation (FM):
Annual Issue Approval Guide Building Materials
- D. Underwriters Laboratories, Inc. (UL):
Annual Issue Building Materials Directory
Annual Issue Fire Resistance Directory
1479-10.....Fire Tests of Through-Penetration Firestops
- E. Warnock Hersey (WH):
Annual Issue Certification Listings

PART 2 - PRODUCTS

2.1 FIRESTOP SYSTEMS

- A. Use either factory built (Firestop Devices) or field erected (through-Penetration Firestop Systems) to form a specific building system maintaining required integrity of the fire barrier and stop the passage of gases or smoke.
- B. Through-penetration firestop systems and firestop devices tested in accordance with ASTM E814 or UL 1479 using the "F" or "T" rating to maintain the same rating and integrity as the fire barrier being sealed. "T" ratings are not required for penetrations smaller than or equal to 100 mm (4 in) nominal pipe or 0.01 m² (16 sq. in.) in overall cross sectional area.
- C. Products requiring heat activation to seal an opening by its intumescence shall exhibit a demonstrated ability to function as designed to maintain the fire barrier.
- D. Firestop sealants used for firestopping or smoke sealing shall have following properties:
 - 1. Contain no flammable or toxic solvents.
 - 2. Have no dangerous or flammable out gassing during the drying or curing of products.
 - 3. Water-resistant after drying or curing and unaffected by high humidity, condensation or transient water exposure.
 - 4. When used in exposed areas, shall be capable of being sanded and finished with similar surface treatments as used on the surrounding wall or floor surface.
- E. Firestopping system or devices used for penetrations by glass pipe, plastic pipe or conduits, unenclosed cables, or other non-metallic materials shall have following properties:

1. Classified for use with the particular type of penetrating material used.
 2. Penetrations containing loose electrical cables, computer data cables, and communications cables protected using firestopping systems that allow unrestricted cable changes without damage to the seal.
 3. Intumescent products which would expand to seal the opening and act as fire, smoke, toxic fumes, and, water sealant.
- F. Maximum flame spread of 25 and smoke development of 50 when tested in accordance with ASTM E84.
- G. FM, UL, or WH rated or tested by an approved laboratory in accordance with ASTM E814.
- H. Materials to be asbestos free.
- I. Firetopping system or device in zero hour rated construction shall be white or grey in color. Firestopping system or device in all other rated construction shall be red in color.

2.2 SMOKE STOPPING IN SMOKE PARTITIONS

- A. Use silicone sealant in smoke partitions.
- B. Use mineral fiber filler and bond breaker behind sealant.
- C. Sealants shall have a maximum flame spread of 25 and smoke developed of 50 when tested in accordance with E84.
- D. When used in exposed areas capable of being sanded and finished with similar surface treatments as used on the surrounding wall or floor surface.

PART 3 - EXECUTION

3.1 EXAMINATION

Submit product data and installation instructions, as required by article, submittals, after an on site examination of areas to receive firestopping.

3.2 PREPARATION

- A. Remove dirt, grease, oil, loose materials, or other substances that prevent adherence and bonding or application of the firestopping or smoke stopping materials.
- B. Remove insulation on insulated pipe for a distance of 150 mm (six inches) on either side of the fire rated assembly prior to applying the firestopping materials unless the firestopping materials are tested and approved for use on insulated pipes.

3.3 INSTALLATION

- A. Do not begin work until the specified material data and installation instructions of the proposed firestopping systems have been submitted and approved.
- B. Install firestopping systems with smoke stopping in accordance with FM, UL, WH, or other approved system details and installation instructions.
- C. Install smoke stopping seals in smoke partitions.

3.4 CLEAN-UP AND ACCEPTANCE OF WORK

- A. As work on each floor is completed, remove materials, litter, and debris.
- B. Do not move materials and equipment to the next-scheduled work area until completed work is inspected and accepted by the Resident Engineer.
- C. Clean up spills of liquid type materials.

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**SECTION 07 92 00
JOINT SEALANTS**

PART 1 - GENERAL

1.1 DESCRIPTION:

Section covers all sealant and caulking materials and their application, wherever required for complete installation of building materials or systems.

1.2 RELATED WORK:

A. Firestopping penetrations: Section 07 84 00, FIRESTOPPING.

1.3 QUALITY CONTROL:

- A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C. Product Testing: Obtain test results from a qualified testing agency based on testing current sealant formulations within a 12-month period.
 - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021.
 - 2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C920, and where applicable, to other standard test methods.
 - 3. Test elastomeric joint sealants according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C920 for adhesion and cohesion under cyclic movement, adhesion-in peel, and indentation hardness.
 - 4. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.
- D. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to joint substrates in accordance with sealant manufacturer's recommendations:
 - 1. Locate test joints where indicated or, if not indicated, as directed by COR.
 - 2. Conduct field tests for each application indicated below:

- a. Each type of elastomeric sealant and joint substrate indicated.
- b. Each type of non-elastomeric sealant and joint substrate indicated.
- 3. Notify COR seven days in advance of dates and times when test joints will be erected.
- E. VOC: Acrylic latex and Silicon sealants shall have less than 50g/l VOC content.

1.4 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's installation instructions for each product used.
- C. Cured samples of exposed sealants for each color where required to match adjacent material.
- D. Manufacturer's Literature and Data:
 - 1. Caulking compound
 - 2. Primers
 - 3. Sealing compound, each type, including compatibility when different sealants are in contact with each other.

1.5 PROJECT CONDITIONS:

- A. Environmental Limitations:
 - 1. Do not proceed with installation of joint sealants under following conditions:
 - a. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 °C (40 °F).
 - b. When joint substrates are wet.
- B. Joint-Width Conditions:
 - 1. Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
- C. Joint-Substrate Conditions:
 - 1. Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.6 DELIVERY, HANDLING, AND STORAGE:

- A. Deliver materials in manufacturers' original unopened containers, with brand names, date of manufacture, shelf life, and material designation clearly marked thereon.
- B. Carefully handle and store to prevent inclusion of foreign materials.
- C. Do not subject to sustained temperatures exceeding 32° C (90° F) or less than 5° C (40° F).

1.7 DEFINITIONS:

- A. Definitions of terms in accordance with ASTM C717 and as specified.
- B. Back-up Rod: A type of sealant backing.
- C. Bond Breakers: A type of sealant backing.
- D. Filler: A sealant backing used behind a back-up rod.

1.8 WARRANTY:

- A. Warranty exterior sealing against leaks, adhesion, and cohesive failure, and subject to terms of "Warranty of Construction", FAR clause 52.246-21, except that warranty period shall be extended to two years.

1.9 APPLICABLE PUBLICATIONS:

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - C509-06(2011).....Elastomeric Cellular Preformed Gasket and Sealing Material.
 - C612-14.....Mineral Fiber Block and Board Thermal Insulation.
 - C717-14a.....Standard Terminology of Building Seals and Sealants.
 - C834-14.....Latex Sealants.
 - C919-12.....Use of Sealants in Acoustical Applications.
 - C920-14a.....Elastomeric Joint Sealants.
 - C1021-08(2014).....Laboratories Engaged in Testing of Building Sealants.
 - C1193-13.....Standard Guide for Use of Joint Sealants.
 - C1330-02(2013).....Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.
 - D1056-14.....Specification for Flexible Cellular Materials—Sponge or Expanded Rubber.

E84-09.....Surface Burning Characteristics of Building
Materials.

C. Sealant, Waterproofing and Restoration Institute (SWRI).
The Professionals' Guide

PART 2 - PRODUCTS

2.1 SEALANTS:

A. S-1:

1. ASTM C920, polyurethane or polysulfide.
2. Type M.
3. Class 25.
4. Grade NS.
5. Shore A hardness of 20-40

B. S-2:

1. ASTM C920, polyurethane or polysulfide.
2. Type M.
3. Class 25.
4. Grade P.
5. Shore A hardness of 25-40.

C. S-3:

1. ASTM C920, polyurethane or polysulfide.
2. Type S.
3. Class 25, joint movement range of plus or minus 50 percent.
4. Grade NS.
5. Shore A hardness of 15-25.
6. Minimum elongation of 700 percent.

D. S-4:

1. ASTM C920 polyurethane or polysulfide.
2. Type S.
3. Class 25.
4. Grade NS.
5. Shore A hardness of 25-40.

E. S-5:

1. ASTM C920, polyurethane or polysulfide.
2. Type S.
3. Class 25.
4. Grade P.

5. Shore hardness of 15-45.

F. S-6:

1. ASTM C920, silicone, neutral cure.
2. Type S.
3. Class: Joint movement range of plus 100 percent to minus 50 percent.
4. Grade NS.
5. Shore A hardness of 15-20.
6. Minimum elongation of 1200 percent.

G. S-7:

1. ASTM C920, silicone, neutral cure.
2. Type S.
3. Class 25.
4. Grade NS.
5. Shore A hardness of 25-30.
6. Structural glazing application.

H. S-8:

1. ASTM C920, silicone, acetoxycure.
2. Type S.
3. Class 25.
4. Grade NS.
5. Shore A hardness of 25-30.
6. Structural glazing application.

I. S-9:

1. ASTM C920 silicone.
2. Type S.
3. Class 25.
4. Grade NS.
5. Shore A hardness of 25-30.
6. Non-yellowing, mildew resistant.

J. S-10:

1. ASTM C920, coal tar extended fuel resistance polyurethane.
2. Type M/S.
3. Class 25.
4. Grade P/NS.
5. Shore A hardness of 15-20.

K. S-11:

1. ASTM C920 polyurethane.

2. Type M/S.
3. Class 25.
4. Grade P/NS.
5. Shore A hardness of 35 to 50.

L. S-12:

1. ASTM C920, polyurethane.
2. Type M/S.
3. Class 25, joint movement range of plus or minus 50 percent.
4. Grade P/NS.
5. Shore A hardness of 25 to 50.

2.2 CAULKING COMPOUND:

- A. C-1: ASTM C834, acrylic latex.
- B. C-2: One component acoustical caulking, non drying, non hardening, synthetic rubber.

2.3 COLOR:

- A. Color of sealants shall match adjacent surfaces, unless specified otherwise.
- B. Caulking shall match adjacent surface, unless specified otherwise.

2.4 JOINT SEALANT BACKING:

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
 1. Type C: Closed-cell material with a surface skin.
- C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 32° C (minus 26° F). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.
- D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint

where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.5 FILLER:

- A. Mineral fiber board: ASTM C612, Class 1.
- B. Thickness same as joint width.
- C. Depth to fill void completely behind back-up rod.

2.6 PRIMER:

- A. As recommended by manufacturer of caulking or sealant material.
- B. Stain free type.

2.7 CLEANERS-NON POUROUS SURFACES:

Chemical cleaners acceptable to manufacturer of sealants and sealant backing material, free of oily residues and other substances capable of staining or harming joint substrates and adjacent non-porous surfaces and formulated to promote adhesion of sealant and substrates.

PART 3 - EXECUTION

3.1 INSPECTION:

- A. Inspect substrate surface for bond breaker contamination and unsound materials at adherent faces of sealant.
- B. Coordinate for repair and resolution of unsound substrate materials.
- C. Inspect for uniform joint widths and that dimensions are within tolerance established by sealant manufacturer.

3.2 PREPARATIONS:

- A. Prepare joints in accordance with manufacturer's instructions and SWRI.
- B. Clean surfaces of joint to receive caulking or sealants leaving joint dry to the touch, free from frost, moisture, grease, oil, wax, lacquer paint, or other foreign matter that would tend to destroy or impair adhesion.
 - 1. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants.
 - 2. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- C. Do not cut or damage joint edges.
- D. Apply masking tape to face of surfaces adjacent to joints before applying primers, caulking, or sealing compounds.
 1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- E. Apply primer to sides of joints wherever required by compound manufacturer's printed instructions.
 1. Apply primer prior to installation of back-up rod or bond breaker tape.
 2. Use brush or other approved means that will reach all parts of joints.
- F. Take all necessary steps to prevent three sided adhesion of sealants.

3.3 BACKING INSTALLATION:

- A. Install back-up material, to form joints enclosed on three sides as required for specified depth of sealant.
- B. Where deep joints occur, install filler to fill space behind the back-up rod and position the rod at proper depth.
- C. Cut fillers installed by others to proper depth for installation of back-up rod and sealants.
- D. Install back-up rod, without puncturing the material, to a uniform depth, within plus or minus 3 mm (1/8 inch) for sealant depths specified.
- E. Where space for back-up rod does not exist, install bond breaker tape strip at bottom (or back) of joint so sealant bonds only to two opposing surfaces.
- F. Take all necessary steps to prevent three sided adhesion of sealants.

3.4 SEALANT DEPTHS AND GEOMETRY:

- A. At widths up to 6 mm (1/4 inch), sealant depth equal to width.
- B. At widths over 6 mm (1/4 inch), sealant depth 1/2 of width up to 13 mm (1/2 inch) maximum depth at center of joint with sealant thickness at center of joint approximately 1/2 of depth at adhesion surface.

3.5 INSTALLATION:

- A. General:
 - 1. Apply sealants and caulking only when ambient temperature is between 5° C and 38° C (40° and 100° F).
 - 2. Do not use polysulfide base sealants where sealant may be exposed to fumes from bituminous materials, or where water vapor in continuous contact with cementitious materials may be present.
 - 3. Do not use sealant type listed by manufacture as not suitable for use in locations specified.
 - 4. Apply caulking and sealing compound in accordance with manufacturer's printed instructions.
 - 5. Avoid dropping or smearing compound on adjacent surfaces.
 - 6. Fill joints solidly with compound and finish compound smooth.
 - 7. Tool joints to concave surface unless shown or specified otherwise.
 - 8. Finish paving or floor joints flush unless joint is otherwise detailed.
 - 9. Apply compounds with nozzle size to fit joint width.
 - 10. Test sealants for compatibility with each other and substrate. Use only compatible sealant.
- B. For application of sealants, follow requirements of ASTM C1193 unless specified otherwise.
- C. Where gypsum board partitions are of sound rated, fire rated, or smoke barrier construction, follow requirements of ASTM C919 only to seal all cut-outs and intersections with the adjoining construction unless specified otherwise.
 - 1. Apply a 6 mm (1/4 inch) minimum bead of sealant each side of runners (tracks), including those used at partition intersections with dissimilar wall construction.
 - 2. Coordinate with application of gypsum board to install sealant immediately prior to application of gypsum board.

3. Partition intersections: Seal edges of face layer of gypsum board abutting intersecting partitions, before taping and finishing or application of veneer plaster-joint reinforcing.
4. Openings: Apply a 6 mm (1/4 inch) bead of sealant around all cut-outs to seal openings of electrical boxes, ducts, pipes and similar penetrations. To seal electrical boxes, seal sides and backs.
5. Control Joints: Before control joints are installed, apply sealant in back of control joint to reduce flanking path for sound through control joint.

3.6 FIELD QUALITY CONTROL:

- A. Field-Adhesion Testing: Field-test joint-sealant adhesion to joint substrates as recommended by sealant manufacturer:
 1. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field adhesion test log.

3.7 CLEANING:

- A. Fresh compound accidentally smeared on adjoining surfaces: Scrape off immediately and rub clean with a solvent as recommended by the caulking or sealant manufacturer.
- B. After filling and finishing joints, remove masking tape.
- C. Leave adjacent surfaces in a clean and unstained condition.

3.8 LOCATIONS:

- A. Exterior Building Joints, Horizontal and Vertical:
 1. Metal to Metal: Type S-1, S-2
 2. Metal to Masonry or Stone: Type S-1
 3. Masonry to Masonry or Stone: Type S-1
 4. Cast Stone to Cast Stone: Type S-1
 5. Threshold Setting Bed: Type S-1, S-3, S-4
 6. Masonry Expansion and Control Joints: Type S-6
- B. Metal Reglets and Flashings:
 1. Flashings to Wall: Type S-6
 2. Metal to Metal: Type S-6
- C. Sanitary Joints:
 1. Walls to Plumbing Fixtures: Type S-9
 2. Counter Tops to Walls: Type S-9
 3. Pipe Penetrations: Type S-9
- D. High Temperature Joints over 204 degrees C (400 degrees F):

1. Exhaust Pipes, Flues, Breech Stacks: Type S-7 or S-8

E. Interior Caulking:

1. Typical Narrow Joint 6 mm, (1/4 inch) or less at Walls and Adjacent Components: Types C-1 and C-2.
2. Perimeter of Doors, Windows, Access Panels which Adjoin Concrete or Masonry Surfaces: Types C-1 and C-2.
3. Joints at Masonry Walls and Columns, Piers, Concrete Walls or Exterior Walls: Types C-1 and C-2.
4. Perimeter of Lead Faced Control Windows and Plaster or Gypsum Wallboard Walls: Types C-1 and C-2.
5. Concealed Acoustic Sealant Types S-4, C-1 and C-2.

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SECTION 13 34 19
PRE-ENGINEERED BUILDING SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

This section covers materials, labor and equipment required to complete the pre-engineered smoke shelter building as shown on detailed drawings and specified.

1.2 RELATED WORK

A. Concrete foundations: Section 03 30 00, CAST-IN-PLACE CONCRETE.

1.3 MANUFACTURERS AND INSTALLERS QUALIFICATIONS

A. Approval by Contracting Officer Representative (COR) is required of products or service of proposed manufacturer, suppliers and installers, and will be based upon submission by Contractor of certification that:

1. For a minimum of 10 years, the manufacturer has successfully furnished the specified kind of pre-engineered building and demonstrates successful performance on comparable projects.
2. Manufacturer's product submitted has been in satisfactory and efficient operation on three installations similar and equivalent to this project for three years. Submit list of installations.
3. The manufacturer is responsible for providing all building components, including structural design of building, building materials, fasteners and miscellaneous equipment.
4. Installer is currently authorized by the manufacturer to install specified items and regularly retains technical qualifications, experience, trained personnel and facilities to complete the specified installation. Approval will not be given, however, where experience record is one of unsatisfactory performance.

1.4 DESIGN CRITERIA

A. Design of a pre-engineered smoke shelter building to resist the following:

1. Roof Snow Load: 25 pounds per square foot applied on horizontal projection of roof structure.
2. Wind Speed: 90 miles per hour.
3. Seismic loading as required by Uniform Building Code.

- B. Shelter building components shall be capable of supporting design loads without permanent deformation, loss of watertightness, or disengagement of any part of installation.

1.5 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:
- B. Samples: Wall, window and roof panels, with factory finish in specified colors. Fasteners for panels.
- C. Certificates:
1. Stating that the zinc coating on steel panels is the specified thickness.
 2. Indicating manufacturers and installers meet qualifications specified.
- D. Manufacturer's Literature and Data:
1. Metal roof
 2. Sealing materials
 3. Automatic door
 4. Windows
 5. Insulation
 6. Aluminum framework
 7. Weather-proof coatings
 8. LED light fixtures
 9. Exhaust fan
 10. Electric heater unit
 11. Air conditioning unit
 12. Ground anchoring equipment
 13. Urns & convenience receptacle

E. Shop Drawings: Shop drawings, erection drawings and erection manuals showing complete erection layouts, installation instructions, and details of connections. Details and layouts shall show framing location, lengths, and markings of panels and other equipment and component parts to correspond with sequence and procedure for erection. Shop drawings shall show connections and anchoring with adjoining concrete slab.

F. Structural Design Analysis:

1. Furnish complete structural design analysis for all structural components of the prefabricated metal buildings.
2. Provide manufacturer load tables indicating the selected panel material, configuration and thickness meets the design requirements for the spans shown.

1.6 STORAGE AND PROTECTION

Materials stored on site before erection shall be stacked and covered with suitable weather tight covering. Store metal panels so that any accumulated water will drain off. Panels shall not be stored in contact with materials that cause staining. Materials having defects or damages that effect appearance, serviceability or use will be rejected.

1.7 WARRANTY

The shelter building shall be warranted against defects in materials and workmanship by both the manufacturer and installer, and that after acceptance of work shall be weather tight and shall be subject to the terms of the "Warranty of Construction" Article in FAR clause 52.246-21, except that the warranty period shall be two years.

1.8 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. Federal Specifications:
- QQ-A-200/9C(1).....Extruded Aluminum Members 6063-T5
- HH-I-521B.....Insulation Board, Semi-Rigid Polyurethane
- TT-S-001657.....Sealants, Type 1
- C. American National Standards Institute (ANSI):
- A58.1.....Gravity and Lateral Loads Design
- D. Uniform Federal Accessibility Standards

- FED-STD-795, 4/1/88.....Door Accessibility
- E. American Architectural Manufacturer's Association (AAMA)
AAMA 2605.....Performance Requirements and Test Procedures
for Superior Performing Organic Coatings on
Aluminum Extrusions and Panels
- F. The Aluminum Association (AA): Designation System for Aluminum
Finishes, Latest Edition
- G. 2010 Standards for Accessible Design (ADA)
- H. Uniform Building Code, Latest Edition.
- I. American Society for Testing and Materials (ASTM):
B209/209M-07.....Aluminum and Aluminum-Alloy Sheet and Plate
C518.....Insulation Board, Semi-Rigid Polyurethane
C920-79.....Elastomeric Joint Sealants Type S, Class 12,
Grade NS
E84.....Standard Method of Test for Surface burning
Characteristics of Building Materials

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Glass: ¼" thick tempered safety glass that is gasketed with wrap-around PVC extrusion and secured to the framing structure with special extrusions to provide a safe weather-protective enclosure in accordance with Fed. Spec. TT-S-001657 using ASTM C920-79 sealants. Color: clear.
- B. Steel Framing and Structural Steel Members: shall be fabricated using 6063-T5 extruded aluminum members Fed. Spec. QQ-A-200/9C(1). 6061-T6 and 6005-T6 alloy/temper shall be used where required.
1. Extrusion shapes shall be engineered to provide a framework of adequate structural integrity to satisfy the Uniform Building Code (UBC), and to meet the requirements for snow, wind and seismic loading for the project site.
 2. Framing members shall be 2 ½" x 2 ½" x 1/8" thick square extruded aluminum tubes.
 3. Fasteners: framework shall be assembled using only stainless steel and aluminum fasteners to prevent rusting and electrolytic interaction with framing metals.

4. Framing components and methods of fastening them to the supporting foundations shall be capable of withstanding lateral loads in accordance with ANSI A58.1 or the Uniform Building Code, whichever is more stringent.
5. Method of mounting framework to concrete pad shall allow for up to 4" of slope adjustment.
6. Color and Finish: Framework shall be Class I anodized in accordance with the Aluminum Association. Color: Bronze
- C. Roofing: configuration of roof shall be metal gable style with extruded aluminum framework and 24 gauge galvalume standing seam roof with 3 coats of resin-based corrosion protection in accordance with AAMA 2605.
 1. Factory applied joint sealant shall be nonhardening elastomeric sealant; ASTM C920, Type S, Class 12, Grade NS; Fed Spec TT-S_1657, Type 1.n.
 2. Field applied sealant shall be as approved by the shelter manufacturer.
- D. Field Fasteners: shall comply with the manufacturer's instructions for fastener types, sizes, quantities and usages.
- E. Miscellaneous Equipment-Install the following equipment in accordance with detailed Drawings.
 1. (4) LED interior lights with photo-cell.
 2. (2) Exhaust fans with 10" diameter propellers and mounted shutters.
 3. (4) 277V 10,000 BTU electric infrared heaters.
 4. (1) Air conditioning unit
 5. (10) urns, wall-mounted aluminum with removable flip tops.
 6. (2) Convenience receptacles.

2.2 FABRICATION

- A. General: Coordinate fabrication and erection of work with related work of other trades. Provide cutouts and supplemental reinforcement as required to accommodate materials and work specified in other sections of the specifications.
- B. Doors and Frames: Doors and frames shall be complete with weatherstrips

PART 3 - EXECUTION

3.1 ERECTION

- A. Examine site areas to receive shelter. Notify COR of any conditions that would adversely affect installation. Do not proceed with installation until conditions are corrected. Ensure site area is clean, correctly located and accurately aligned.
- B. Bolt settings and other dimensions shall be held to a tolerance of plus or minus 3 mm (1/8-inch). Use templates or other gaging devices to assure accurate spacing of anchor bolts. Bolt field connections unless otherwise shown or specified.
 - 1. Set accurately bases to obtain uniform bearing and maintain established slab elevations. Anchors and anchor bolts for securing members to concrete slab shall be set accurately to templates and of proper size to adequately resist applicable design loads at the base.
- C. Wall Panels: Panels shall be applied with configurations running in a vertical position. Supply panels in single lengths from base to eave with no horizontal joints, except at the junction of door units, louver panels, and similar openings. Walls shall be closed at eave and around doors, frames, louvers, and other similar openings by flashings and/or formed closures to assure adequate weathertightness. Flashing or stops will not be required where weather-closed or approved self-flashing panels are used.
- D. Roof Panels: Roof panels shall be applied with configurations running in direction of roof slope. Supply panels with no transverse joints except at roof ridge. Lay side laps away from prevailing winds, and seal side laps and end-laps of roof with roof joint sealant. Roof shall be flashed and/or sealed at ridge, eaves and rakes, and elsewhere as necessary to make roof weather tight. Flashing and/or caulking shall be accomplished in a manner that will assure complete weather-tightness and method to be used shall be subject to approval by the COR. Minimum end-laps for roofing and ridge caps shall be of sizes and methods of shelter manufacturer.
- E. Fasteners for Securing Roof and Wall Panels: Fastening method, size and spacing shall be as recommended by shelter building manufacturer and as

approved by the COR. Fasteners shall be non-corrosive and of design that will produce a weathertight connection. Clearly show fasteners and fastening method on shop and erection drawings. Field paint exterior exposed fastenings to match adjacent panels.

- F. Door Frame Installation: Set frames plumb and align and brace securely until permanent anchors are set. Build in wall anchors or secure to adjoining construction as indicated or specified. Where frames require overhead bracing, securely anchor to structure above.
- G. Weatherproofing: Joint sealing shall be installed under this section and shall be guaranteed as specified. Color of sealing materials shall match adjacent shelter building components.
- H. Repair any damages to shelter building components and clean in accordance with manufacturer's instructions. Clean shelter components immediately after installation.

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SECTION 26 05 11
REQUIREMENTS FOR ELECTRICAL INSTALLATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section applies to all sections of Division 26.
- B. Furnish and install electrical systems, materials, equipment, and accessories in accordance with the specifications and drawings. Capacities and ratings of motors, transformers, conductors and cable, switchboards, switchgear, panelboards, motor control centers, generators, automatic transfer switches, and other items and arrangements for the specified items are shown on the drawings.
- C. Electrical service entrance equipment and arrangements for temporary and permanent connections to the electric utility company's system shall conform to the electric utility company's requirements. Coordinate fuses, circuit breakers and relays with the electric utility company's system, and obtain electric utility company approval for sizes and settings of these devices.
- D. Conductor ampacities specified or shown on the drawings are based on copper conductors, with the conduit and raceways sized per NEC. Aluminum conductors are prohibited.

1.2 MINIMUM REQUIREMENTS

- A. The International Building Code (IBC), National Electrical Code (NEC), Underwriters Laboratories, Inc. (UL), and National Fire Protection Association (NFPA) codes and standards are the minimum requirements for materials and installation.
- B. The drawings and specifications shall govern in those instances where requirements are greater than those stated in the above codes and standards.

1.3 TEST STANDARDS

- A. All materials and equipment shall be listed, labeled, or certified by a Nationally Recognized Testing Laboratory (NRTL) to meet Underwriters Laboratories, Inc. (UL), standards where test standards have been established. Materials and equipment which are not covered by UL standards will be accepted, providing that materials and equipment are listed, labeled, certified or otherwise determined to meet the safety requirements of a NRTL. Materials and equipment which no NRTL accepts, certifies, lists, labels, or determines to be safe, will be considered if inspected or tested in accordance with national industrial standards, such as ANSI, NEMA, and NETA. Evidence of compliance shall include certified test reports and definitive shop drawings.
- B. Definitions:

1. Listed: Materials and equipment included in a list published by an organization that is acceptable to the Authority Having Jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production or listed materials and equipment or periodic evaluation of services, and whose listing states that the materials and equipment either meets appropriate designated standards or has been tested and found suitable for a specified purpose.
2. Labeled: Materials and equipment to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the Authority Having Jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled materials and equipment, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.
3. Certified: Materials and equipment which:
 - a. Have been tested and found by a NRTL to meet nationally recognized standards or to be safe for use in a specified manner.
 - b. Are periodically inspected by a NRTL.
 - c. Bear a label, tag, or other record of certification.
4. Nationally Recognized Testing Laboratory: Testing laboratory which is recognized and approved by the Secretary of Labor in accordance with OSHA regulations.

1.4 QUALIFICATIONS (PRODUCTS AND SERVICES)

- A. Manufacturer's Qualifications: The manufacturer shall regularly and currently produce, as one of the manufacturer's principal products, the materials and equipment specified for this project, and shall have manufactured the materials and equipment for at least three years.
- B. Product Qualification:
 1. Manufacturer's materials and equipment shall have been in satisfactory operation, on three installations of similar size and type as this project, for at least three years.
 2. The Government reserves the right to require the Contractor to submit a list of installations where the materials and equipment have been in operation before approval.
- C. Service Qualifications: There shall be a permanent service organization maintained or trained by the manufacturer which will render satisfactory service to this installation within eight hours of receipt of notification that service is needed. Submit name and address of service organizations.

1.5 APPLICABLE PUBLICATIONS

- A. Applicable publications listed in all Sections of Division 26 are the latest issue, unless otherwise noted.
- B. Products specified in all sections of Division 26 shall comply with the applicable publications listed in each section.

1.6 MANUFACTURED PRODUCTS

- A. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, and for which replacement parts shall be available.
- B. When more than one unit of the same class or type of materials and equipment is required, such units shall be the product of a single manufacturer.
- C. Equipment Assemblies and Components:
 - 1. Components of an assembled unit need not be products of the same manufacturer.
 - 2. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.
 - 3. Components shall be compatible with each other and with the total assembly for the intended service.
 - 4. Constituent parts which are similar shall be the product of a single manufacturer.
- D. Factory wiring and terminals shall be identified on the equipment being furnished and on all wiring diagrams.
- E. When Factory Testing Is Specified:
 - 1. The Government shall have the option of witnessing factory tests. The Contractor shall notify the Government through the COR a minimum of 15 working days prior to the manufacturer's performing the factory tests.
 - 2. Four copies of certified test reports shall be furnished to the COR two weeks prior to final inspection and not more than 90 days after completion of the tests.
 - 3. When materials and equipment fail factory tests, and re-testing and re-inspection is required, the Contractor shall be liable for all additional expenses for the Government to witness re-testing.

1.7 VARIATIONS FROM CONTRACT REQUIREMENTS

- A. Where the Government or the Contractor requests variations from the contract requirements, the connecting work and related components shall include, but not be limited to additions or changes to branch circuits, circuit protective devices, conduits, wire, feeders, controls, panels and installation methods.

1.8 MATERIALS AND EQUIPMENT PROTECTION

- A. Materials and equipment shall be protected during shipment and storage against physical damage, vermin, dirt, corrosive substances, fumes, moisture, cold and rain.
 - 1. Store materials and equipment indoors in clean dry space with uniform temperature to prevent condensation.

2. During installation, equipment shall be protected against entry of foreign matter, and be vacuum-cleaned both inside and outside before testing and operating. Compressed air shall not be used to clean equipment. Remove loose packing and flammable materials from inside equipment.
3. Damaged equipment shall be repaired or replaced, as determined by the COR.
4. Painted surfaces shall be protected with factory installed removable heavy kraft paper, sheet vinyl or equal.
5. Damaged paint on equipment shall be refinished with the same quality of paint and workmanship as used by the manufacturer so repaired areas are not obvious.

1.9 WORK PERFORMANCE

- A. All electrical work shall comply with the requirements of NFPA 70 (NEC), NFPA 70B, NFPA 70E, OSHA Part 1910 subpart J - General Environmental Controls, OSHA Part 1910 subpart K - Medical and First Aid, and OSHA Part 1910 subpart S - Electrical, in addition to other references required by contract.
- B. Job site safety and worker safety is the responsibility of the Contractor.
- C. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished in this manner for the required work, the following requirements are mandatory:
 1. Electricians must use full protective equipment (i.e., certified and tested insulating material to cover exposed energized electrical components, certified and tested insulated tools, etc.) while working on energized systems in accordance with NFPA 70E.
 2. Before initiating any work, a job specific work plan must be developed by the Contractor with a peer review conducted and documented by the COR and Medical Center staff. The work plan must include procedures to be used on and near the live electrical equipment, barriers to be installed, safety equipment to be used, and exit pathways.
 3. Work on energized circuits or equipment cannot begin until prior written approval is obtained from the COR.
- D. For work that affects existing electrical systems, arrange, phase and perform work to assure minimal interference with normal functioning of the facility. Refer to Article OPERATIONS AND STORAGE AREAS under Section 01 00 00, GENERAL REQUIREMENTS.
- E. New work shall be installed and connected to existing work neatly, safely and professionally. Disturbed or damaged work shall be replaced or repaired to its prior conditions, as required by Section 01 00 00, GENERAL REQUIREMENTS.
- F. Coordinate location of equipment and conduit with other trades to minimize interference.

1.10 EQUIPMENT INSTALLATION AND REQUIREMENTS

- A. Equipment location shall be as close as practical to locations shown on the drawings.
- B. Working clearances shall not be less than specified in the NEC.
- C. Inaccessible Equipment:
 - 1. Where the Government determines that the Contractor has installed equipment not readily accessible for operation and maintenance, the equipment shall be removed and reinstalled as directed at no additional cost to the Government.
 - 2. "Readily accessible" is defined as being capable of being reached quickly for operation, maintenance, or inspections without the use of ladders, or without climbing or crawling under or over obstacles such as, but not limited to, motors, pumps, belt guards, transformers, piping, ductwork, conduit and raceways.
- D. Electrical service entrance equipment and arrangements for temporary and permanent connections to the electric utility company's system shall conform to the electric utility company's requirements. Coordinate fuses, circuit breakers and relays with the electric utility company's system, and obtain electric utility company approval for sizes and settings of these devices.

1.11 EQUIPMENT IDENTIFICATION

- A. In addition to the requirements of the NEC, install an identification sign which clearly indicates information required for use and maintenance of items such as switchboards and switchgear, panelboards, cabinets, motor controllers, fused and non-fused safety switches, generators, automatic transfer switches, separately enclosed circuit breakers, individual breakers and controllers in switchboards, switchgear and motor control assemblies, control devices and other significant equipment.
- B. Identification signs for Normal Power System equipment shall be laminated black phenolic resin with a white core with engraved lettering. Identification signs for Essential Electrical System (EES) equipment, as defined in the NEC, shall be laminated red phenolic resin with a white core with engraved lettering. Lettering shall be a minimum of 12 mm (1/2 inch) high. Identification signs shall indicate equipment designation, rated bus amperage, voltage, number of phases, number of wires, and type of EES power branch as applicable. Secure nameplates with screws.
- C. Install adhesive arc flash warning labels on all equipment as required by NFPA 70E. Label shall indicate the arc hazard boundary (inches), working distance (inches), arc flash incident energy at the working distance (calories/cm²), required PPE category and description including the glove rating, voltage rating of the equipment, limited approach distance (inches), restricted approach distance (inches), prohibited approach distance (inches), equipment/bus name, date prepared, and manufacturer name and address.

1.12 SUBMITTALS

- A. Submit to the COR in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

- B. The Government's approval shall be obtained for all materials and equipment before delivery to the job site. Delivery, storage or installation of materials and equipment which has not had prior approval will not be permitted.
- C. All submittals shall include six copies of adequate descriptive literature, catalog cuts, shop drawings, test reports, certifications, samples, and other data necessary for the Government to ascertain that the proposed materials and equipment comply with drawing and specification requirements. Catalog cuts submitted for approval shall be legible and clearly identify specific materials and equipment being submitted.
- D. Submittals for individual systems and equipment assemblies which consist of more than one item or component shall be made for the system or assembly as a whole. Partial submittals will not be considered for approval.
 - 1. Mark the submittals, "SUBMITTED UNDER SECTION_____".
 - 2. Submittals shall be marked to show specification reference including the section and paragraph numbers.
 - 3. Submit each section separately.
- E. The submittals shall include the following:
 - 1. Information that confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, manuals, pictures, nameplate data, and test reports as required.
 - 2. Submittals are required for all equipment anchors and supports. Submittals shall include weights, dimensions, center of gravity, standard connections, manufacturer's recommendations and behavior problems (e.g., vibration, thermal expansion, etc.) associated with equipment or piping so that the proposed installation can be properly reviewed. Include sufficient fabrication information so that appropriate mounting and securing provisions may be designed and attached to the equipment.
 - 3. Elementary and interconnection wiring diagrams for communication and signal systems, control systems, and equipment assemblies. All terminal points and wiring shall be identified on wiring diagrams.
 - 4. Parts list which shall include information for replacement parts and ordering instructions, as recommended by the equipment manufacturer.
- F. Maintenance and Operation Manuals:
 - 1. Submit as required for systems and equipment specified in the technical sections. Furnish in hardcover binders or an approved equivalent.
 - 2. Inscribe the following identification on the cover: the words "MAINTENANCE AND OPERATION MANUAL," the name and location of the system, material, equipment, building, name of Contractor, and contract name and number. Include in the manual the names, addresses, and telephone numbers of each subcontractor installing the system or equipment and the local representatives for the material or equipment.

3. Provide a table of contents and assemble the manual to conform to the table of contents, with tab sheets placed before instructions covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in.
4. The manuals shall include:
 - a. Internal and interconnecting wiring and control diagrams with data to explain detailed operation and control of the equipment.
 - b. A control sequence describing start-up, operation, and shutdown.
 - c. Description of the function of each principal item of equipment.
 - d. Installation instructions.
 - e. Safety precautions for operation and maintenance.
 - f. Diagrams and illustrations.
 - g. Periodic maintenance and testing procedures and frequencies, including replacement parts numbers.
 - h. Performance data.
 - i. Pictorial "exploded" parts list with part numbers. Emphasis shall be placed on the use of special tools and instruments. The list shall indicate sources of supply, recommended spare and replacement parts, and name of servicing organization.
 - j. List of factory approved or qualified permanent servicing organizations for equipment repair and periodic testing and maintenance, including addresses and factory certification qualifications.
- G. Approvals will be based on complete submission of shop drawings, manuals, test reports, certifications, and samples as applicable.
- H. After approval and prior to installation, furnish the COR with one sample of each of the following:
 1. A minimum 300 mm (12 inches) length of each type and size of wire and cable along with the tag from the coils or reels from which the sample was taken. The length of the sample shall be sufficient to show all markings provided by the manufacturer.
 2. Each type of conduit coupling, bushing, and termination fitting.
 3. Conduit hangers, clamps, and supports.
 4. Duct sealing compound.
 5. Each type of receptacle, toggle switch, lighting control sensor, outlet box, manual motor starter, device wall plate, engraved nameplate, wire and cable splicing and terminating material, and branch circuit single pole molded case circuit breaker.

1.13 SINGULAR NUMBER

- A. Where any device or part of equipment is referred to in these specifications in the singular number (e.g., "the switch"), this reference shall be deemed to apply to as many such devices as are required to complete the installation as shown on the drawings.

1.14 POLYCHLORINATED BIPHENYL (PCB) EQUIPMENT

- A. This project requires the removal, transport, and disposal of electrical equipment containing Polychlorinated Biphenyls (PCB) in accordance with the Federal Toxic Substances Control Act (TSCA).
- B. The equipment to be removed is shown on the drawings.

1.15 Acceptance Checks and Tests

- A. The Contractor shall furnish the instruments, materials, and labor for tests.
- B. Where systems are comprised of components specified in more than one section of Division 26, the Contractor shall coordinate the installation, testing, and adjustment of all components between various manufacturer's representatives and technicians so that a complete, functional, and operational system is delivered to the Government.
- C. When test results indicate any defects, the Contractor shall repair or replace the defective materials or equipment, and repeat the tests. Repair, replacement, and retesting shall be accomplished at no additional cost to the Government.

1.16 WARRANTY

- A. All work performed and all equipment and material furnished under this Division shall be free from defects and shall remain so for a period of one year from the date of acceptance of the entire installation by the Contracting Officer for the Government.

1.17 INSTRUCTION

- A. Instruction to designated Government personnel shall be provided for the particular equipment or system as required in each associated technical specification section.
- B. Furnish the services of competent instructors to give full instruction in the adjustment, operation, and maintenance of the specified equipment and system, including pertinent safety requirements. Instructors shall be thoroughly familiar with all aspects of the installation, and shall be trained in operating theory as well as practical operation and maintenance procedures.
- C. A training schedule shall be developed and submitted by the Contractor and approved by the COR at least 30 days prior to the planned training.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION (Not used)

---END---

SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the furnishing, installation, connection, and testing of the electrical conductors and cables for use in electrical systems rated 600 V and below, indicated as cable(s), conductor(s), wire, or wiring in this section.

1.2 RELATED WORK

- A. Section 07 84 00, FIRESTOPPING: Sealing around penetrations to maintain the integrity of fire-resistant rated construction.
- B. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.
- C. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.
- D. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits for conductors and cables.

1.3 QUALITY ASSURANCE

- A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES), in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 FACTORY TESTS

- A. Conductors and cables shall be thoroughly tested at the factory per NEMA to ensure that there are no electrical defects. Factory tests shall be certified.

1.5 SUBMITTALS

- A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
 - 1. Shop Drawings:
 - a. Submit sufficient information to demonstrate compliance with drawings and specifications.
 - b. Submit the following data for approval:
 - 1) Electrical ratings and insulation type for each conductor and cable.
 - 2) Splicing materials and pulling lubricant.
 - 2. Certifications: Two weeks prior to final inspection, submit the following.
 - a. Certification by the manufacturer that the conductors and cables conform to the requirements of the drawings and specifications.

- b. Certification by the Contractor that the conductors and cables have been properly installed, adjusted, and tested.

1.6 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are reference in the text by designation only.
- B. American Society of Testing Material (ASTM):
 - 1. D2301-10 Standard Specification for Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape
 - 2. D2304-10 Test Method for Thermal Endurance of Rigid Electrical Insulating Materials
 - 3. D3005-10 Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape
- C. National Electrical Manufacturers Association (NEMA):
 - 1. WC 70-09 Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy
- D. National Fire Protection Association (NFPA):
 - 1. 70-11 National Electrical Code (NEC)
- E. Underwriters Laboratories, Inc. (UL):
 - 1. 44-10 Thermoset-Insulated Wires and Cables
 - 2. 83-08 Thermoplastic-Insulated Wires and Cables
 - 3. 467-07 Grounding and Bonding Equipment
 - 4. 486A-486B-03 Wire Connectors
 - 5. 486C-04 Splicing Wire Connectors
 - 6. 486D-05 Sealed Wire Connector Systems
 - 7. 486E-09 Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors
 - 8. 493-07 Thermoplastic-Insulated Underground Feeder and Branch Circuit Cables
 - 9. 514B-04 Conduit, Tubing, and Cable Fittings

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Conductors and cables shall be in accordance with NEMA, UL, as specified herein, and as shown on the drawings.
- B. All conductors shall be copper.
- C. Single Conductor and Cable:
 - 1. No. 12 AWG: Minimum size, except where smaller sizes are specified herein or shown on the drawings.
 - 2. No. 8 AWG and larger: Stranded.

3. No. 10 AWG and smaller: Solid; except shall be stranded for final connection to motors, transformers, and vibrating equipment.
4. Insulation: THHN-THWN and XHHW-2. XHHW-2 shall be used for isolated power systems.

D. Color Code:

1. No. 10 AWG and smaller: Solid color insulation or solid color coating.
2. No. 8 AWG and larger: Color-coded using one of the following methods:
 - a. Solid color insulation or solid color coating.
 - b. Stripes, bands, or hash marks of color specified.
 - c. Color using 19 mm (0.75 inches) wide tape.
3. For modifications and additions to existing wiring systems, color coding shall conform to the existing wiring system.
4. Conductors shall be color-coded as follows:

| 208/120 V | Phase | 480/277 V |
|--|---------|-----------|
| Black | A | Brown |
| Red | B | Orange |
| Blue | C | Yellow |
| White | Neutral | Gray * |
| * or white with colored (other than green) tracer. | | |

5. Lighting circuit "switch legs", and 3-way and 4-way switch "traveling wires," shall have color coding that is unique and distinct (e.g., pink and purple) from the color coding indicated above. The unique color codes shall be solid and in accordance with the NEC. Coordinate color coding in the field with the COR.
6. Color code for isolated power system wiring shall be in accordance with the NEC.

2.2 SPLICES

- A. Splices shall be in accordance with NEC and UL.
- B. Above Ground Splices for No. 10 AWG and Smaller:
 1. Solderless, screw-on, reusable pressure cable type, with integral insulation, approved for copper and aluminum conductors.
 2. The integral insulator shall have a skirt to completely cover the stripped conductors.
 3. The number, size, and combination of conductors used with the connector, as listed on the manufacturer's packaging, shall be strictly followed.
- C. Above Ground Splices for No. 8 AWG to No. 4/0 AWG:
 1. Compression, hex screw, or bolt clamp-type of high conductivity and corrosion-resistant material, listed for use with copper and aluminum conductors.

2. Insulate with materials approved for the particular use, location, voltage, and temperature. Insulation level shall be not less than the insulation level of the conductors being joined.
 3. Splice and insulation shall be product of the same manufacturer.
 4. All bolts, nuts, and washers used with splices shall be zinc-plated or cadmium-plated steel.
- D. Above Ground Splices for 250 kcmil and Larger:
1. Long barrel "butt-splice" or "sleeve" type compression connectors, with minimum of two compression indents per wire, listed for use with copper and aluminum conductors.
 2. Insulate with materials approved for the particular use, location, voltage, and temperature. Insulation level shall be not less than the insulation level of the conductors being joined.
 3. Splice and insulation shall be product of the same manufacturer.
- E. Underground Splices for No. 10 AWG and Smaller:
1. Solderless, screw-on, reusable pressure cable type, with integral insulation. Listed for wet locations, and approved for copper and aluminum conductors.
 2. The integral insulator shall have a skirt to completely cover the stripped conductors.
 3. The number, size, and combination of conductors used with the connector, as listed on the manufacturer's packaging, shall be strictly followed.
- F. Underground Splices for No. 8 AWG and Larger:
1. Mechanical type, of high conductivity and corrosion-resistant material. Listed for wet locations, and approved for copper and aluminum conductors.
 2. Insulate with materials approved for the particular use, location, voltage, and temperature. Insulation level shall be not less than the insulation level of the conductors being joined.
- G. Splice and insulation shall be product of the same manufacturer.
- H. Plastic electrical insulating tape: Per ASTM D2304, flame-retardant, cold and weather resistant.

2.3 CONNECTORS AND TERMINATIONS

- A. Mechanical type of high conductivity and corrosion-resistant material, listed for use with copper and aluminum conductors.
- B. Long barrel compression type of high conductivity and corrosion-resistant material, with minimum of two compression indents per wire, listed for use with copper and aluminum conductors.
- C. All bolts, nuts, and washers used to connect connections and terminations to bus bars or other termination points shall be zinc-plated or cadmium-plated steel.

2.4 CONTROL WIRING

- A. Unless otherwise specified elsewhere in these specifications, control wiring shall be as specified herein, except that the minimum size shall be not less than No. 14 AWG.
- B. Control wiring shall be sized such that the voltage drop under in-rush conditions does not adversely affect operation of the controls.

2.5 WIRE LUBRICATING COMPOUND

- A. Lubricating compound shall be suitable for the wire insulation and conduit, and shall not harden or become adhesive.
- B. Shall not be used on conductors for isolated power systems.

PART 3 - EXECUTION

3.1 GENERAL

- A. Install conductors in accordance with the NEC, as specified, and as shown on the drawings.
- B. Install all conductors in raceway systems.
- C. Splice conductors only in outlet boxes, junction boxes, pullboxes, manholes, or handholes.
- D. Conductors of different systems (e.g., 120 V and 277 V) shall not be installed in the same raceway.
- E. Install cable supports for all vertical feeders in accordance with the NEC. Provide split wedge type which firmly clamps each individual cable and tightens due to cable weight.
- F. In panelboards, cabinets, wireways, switches, enclosures, and equipment assemblies, neatly form, train, and tie the conductors with non-metallic ties.
- G. For connections to motors, transformers, and vibrating equipment, stranded conductors shall be used only from the last fixed point of connection to the motors, transformers, or vibrating equipment.
- H. Use expanding foam or non-hardening duct-seal to seal conduits entering a building, after installation of conductors.
- I. Conductor and Cable Pulling:
 - 1. Provide installation equipment that will prevent the cutting or abrasion of insulation during pulling. Use lubricants approved for the cable.
 - 2. Use nonmetallic pull ropes.
 - 3. Attach pull ropes by means of either woven basket grips or pulling eyes attached directly to the conductors.
 - 4. All conductors in a single conduit shall be pulled simultaneously.
 - 5. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- J. No more than three branch circuits shall be installed in any one conduit.

- K. When stripping stranded conductors, use a tool that does not damage the conductor or remove conductor strands.

3.2 SPLICE AND TERMINATION INSTALLATION

- A. Splices and terminations shall be mechanically and electrically secure, and tightened to manufacturer's published torque values using a torque screwdriver or wrench.
- B. Where the Government determines that unsatisfactory splices or terminations have been installed, replace the splices or terminations at no additional cost to the Government.

3.3 CONDUCTOR IDENTIFICATION

- A. When using colored tape to identify phase, neutral, and ground conductors larger than No. 8 AWG, apply tape in half-overlapping turns for a minimum of 75 mm (3 inches) from terminal points, and in junction boxes, pullboxes, and manholes. Apply the last two laps of tape with no tension to prevent possible unwinding. Where cable markings are covered by tape, apply tags to cable, stating size and insulation type.

3.4 FEEDER CONDUCTOR IDENTIFICATION

- A. In each interior pullbox and each underground manhole and handhole, install brass tags on all feeder conductors to clearly designate their circuit identification and voltage. The tags shall be the embossed type, 40 mm (1-1/2 inches) in diameter and 40 mils thick. Attach tags with plastic ties.

3.5 EXISTING CONDUCTORS

- A. Unless specifically indicated on the plans, existing conductors shall not be reused.

3.6 CONTROL WIRING INSTALLATION

- A. Unless otherwise specified in other sections, install control wiring and connect to equipment to perform the required functions as specified or as shown on the drawings.
- B. Install a separate power supply circuit for each system, except where otherwise shown on the drawings.

3.7 CONTROL WIRING IDENTIFICATION

- A. Install a permanent wire marker on each wire at each termination.
- B. Identifying numbers and letters on the wire markers shall correspond to those on the wiring diagrams used for installing the systems.
- C. Wire markers shall retain their markings after cleaning.

3.8 ACCEPTANCE CHECKS AND TESTS

- A. Perform in accordance with the manufacturer's recommendations. In addition, include the following:
 - 1. Visual Inspection and Tests: Inspect physical condition.
 - 2. Electrical tests:

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PROJECT #:541-17-212

- a. After installation but before connection to utilization devices, such as fixtures, motors, or appliances, test conductors phase-to-phase and phase-to-ground resistance with an insulation resistance tester. Existing conductors to be reused shall also be tested.
- b. Applied voltage shall be 500 V DC for 300 V rated cable, and 1000 V DC for 600 V rated cable. Apply test for one minute or until reading is constant for 15 seconds, whichever is longer. Minimum insulation resistance values shall not be less than 25 megohms for 300 V rated cable and 100 megohms for 600 V rated cable.
- c. Perform phase rotation test on all three-phase circuits.

---END---

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the furnishing, installation, connection, and testing of grounding and bonding equipment, indicated as grounding equipment in this section.
- B. "Grounding electrode system" refers to grounding electrode conductors and all electrodes required or allowed by NEC, as well as made, supplementary, and lightning protection system grounding electrodes.
- C. The terms "connect" and "bond" are used interchangeably in this section and have the same meaning.

1.2 RELATED WORK

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.
- B. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Low-voltage conductors.
- C. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduit and boxes.
- D. Section 26 24 16, PANELBOARDS: Low-voltage panelboards.

1.3 QUALITY ASSURANCE

- A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES), in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

- A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
 - 1. Shop Drawings:
 - a. Submit sufficient information to demonstrate compliance with drawings and specifications.
 - b. Submit plans showing the location of system grounding electrodes and connections, and the routing of aboveground and underground grounding electrode conductors.
 - 2. Test Reports:
 - a. Two weeks prior to the final inspection, submit ground resistance field test reports to the COR.
 - 3. Certifications:
 - a. Certification by the Contractor that the grounding equipment has been properly installed and tested.

1.5 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.
- B. American Society for Testing and Materials (ASTM):
 - 1. B1-07 Standard Specification for Hard-Drawn Copper Wire
 - 2. B3-07 Standard Specification for Soft or Annealed Copper Wire
 - 3. B8-11 Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
- C. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - 1. 81-83 IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System Part 1: Normal Measurements
- D. National Fire Protection Association (NFPA):
 - 1. 70-11 National Electrical Code (NEC)
 - 2. 70E-12 National Electrical Safety Code
 - 3. 99-12 Health Care Facilities
- E. Underwriters Laboratories, Inc. (UL):
 - 1. 44-10 Thermoset-Insulated Wires and Cables
 - 2. 83-08 Thermoplastic-Insulated Wires and Cables
 - 3. 467-07 Grounding and Bonding Equipment

PART 2 - PRODUCTS

2.1 GROUNDING AND BONDING CONDUCTORS

- A. Equipment grounding conductors shall be insulated stranded copper, except that sizes No. 10 AWG and smaller shall be solid copper. Insulation color shall be continuous green for all equipment grounding conductors, except that wire sizes No. 4 AWG and larger shall be identified per NEC.
- B. Bonding conductors shall be bare stranded copper, except that sizes No. 10 AWG and smaller shall be bare solid copper. Bonding conductors shall be stranded for final connection to motors, transformers, and vibrating equipment.
- C. Conductor sizes shall not be less than shown on the drawings, or not less than required by the NEC, whichever is greater.
- D. Insulation: THHN-THWN and XHHW-2. XHHW-2 shall be used for isolated power systems.

2.2 GROUND CONNECTIONS

- A. Below Grade and Inaccessible Locations: Exothermic-welded type connectors.
- B. Above Grade:

1. Bonding Jumpers: Listed for use with aluminum and copper conductors. For wire sizes No. 8 AWG and larger, use compression-type connectors. For wire sizes smaller than No. 8 AWG, use mechanical type lugs. Connectors or lugs shall use zinc-plated steel bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.
2. Connection to Building Steel: Exothermic-welded type connectors.
3. Connection to Grounding Bus Bars: Listed for use with aluminum and copper conductors. Use mechanical type lugs, with zinc-plated steel bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.
4. Connection to Equipment Rack and Cabinet Ground Bars: Listed for use with aluminum and copper conductors. Use mechanical type lugs, with zinc-plated steel bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.

2.3 EQUIPMENT RACK AND CABINET GROUND BARS

- A. Provide solid copper ground bars designed for mounting on the framework of open or cabinet-enclosed equipment racks. Ground bars shall have minimum dimensions of 6.3 mm (0.25 inch) thick x 19 mm (0.75 inch) wide, with length as required or as shown on the drawings. Provide insulators and mounting brackets.

2.4 GROUND TERMINAL BLOCKS

- A. At any equipment mounting location (e.g., backboards and hinged cover enclosures) where rack-type ground bars cannot be mounted, provide mechanical type lugs, with zinc-plated steel bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.

2.5 GROUNDING BUS BAR

- A. Pre-drilled rectangular copper bar with stand-off insulators, minimum 6.3 mm (0.25 inch) thick x 100 mm (4 inches) high in cross-section, length as shown on the drawings, with hole size, quantity, and spacing per detail shown on the drawings. Provide insulators and mounting brackets.

PART 3 - EXECUTION

3.1 GENERAL

- A. Install grounding equipment in accordance with the NEC, as shown on the drawings, and as specified herein.
- B. System Grounding:
 1. Secondary service neutrals: Ground at the supply side of the secondary disconnecting means and at the related transformer.
 2. Separately derived systems (transformers downstream from the service entrance): Ground the secondary neutral.
 3. Isolation transformers and isolated power systems shall not be system grounded.

- C. Equipment Grounding: Metallic piping, building structural steel, electrical enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits, shall be bonded and grounded.
- D. For patient care area electrical power system grounding, conform to NFPA 99 and NEC.

3.2 INACCESSIBLE GROUNDING CONNECTIONS

- A. Make grounding connections, which are normally buried or otherwise inaccessible, by exothermic weld.

3.3 MEDIUM-VOLTAGE EQUIPMENT AND CIRCUITS

- A. Switchgear: Provide a bare grounding electrode conductor from the switchgear ground bus to the grounding electrode system.
- B. Duct Banks and Manholes: Provide an insulated equipment grounding conductor in each duct containing medium-voltage conductors, sized per NEC except that minimum size shall be No. 2 AWG. Bond the equipment grounding conductors to the switchgear ground bus, to all manhole grounding provisions and hardware, to the cable shield grounding provisions of medium-voltage cable splices and terminations, and to equipment enclosures.
- C. Pad-Mounted Transformers:
 - 1. Provide a driven ground rod and bond with a grounding electrode conductor to the transformer grounding pad.
 - 2. Ground the secondary neutral.
- D. Lightning Arresters: Connect lightning arresters to the equipment ground bus or ground rods as applicable.

3.4 SECONDARY VOLTAGE EQUIPMENT AND CIRCUITS

- A. Main Bonding Jumper: Bond the secondary service neutral to the ground bus in the service equipment.
- B. Metallic Piping, Building Structural Steel, and Supplemental Electrode(s):
 - 1. Provide a grounding electrode conductor sized per NEC between the service equipment ground bus and all metallic water pipe systems, building structural steel, and supplemental or made electrodes. Provide jumpers across insulating joints in the metallic piping.
 - 2. Provide a supplemental ground electrode as shown on the drawings and bond to the grounding electrode system.
- C. Switchgear, Switchboards, Unit Substations, Panelboards, Motor Control Centers, Engine-Generators, Automatic Transfer Switches, and other electrical equipment:
 - 1. Connect the equipment grounding conductors to the ground bus.
 - 2. Connect metallic conduits by grounding bushings and equipment grounding conductor to the equipment ground bus.
- D. Transformers:

1. Separately derived systems (transformers downstream from service equipment): Ground the secondary neutral at the transformer. Provide a grounding electrode conductor from the transformer to the nearest metal water pipe grounding electrode or structural metal grounding electrode.

3.5 RACEWAY

A. Conduit Systems:

1. Ground all metallic conduit systems. All metallic conduit systems shall contain an equipment grounding conductor.
2. Metallic conduits which terminate without mechanical connection to an electrical equipment housing by means of locknut and bushings or adapters, shall be provided with grounding bushings. Connect bushings with a equipment grounding conductor to the equipment ground bus.

B. Feeders and Branch Circuits: Install equipment grounding conductors with all feeders, and power and lighting branch circuits.

C. Boxes, Cabinets, Enclosures, and Panelboards:

1. Bond the equipment grounding conductor to each pullbox, junction box, outlet box, device box, cabinets, and other enclosures through which the conductor passes (except for special grounding systems for intensive care units and other critical units shown).
2. Provide lugs in each box and enclosure for equipment grounding conductor termination.

D. Wireway Systems:

1. Bond the metallic structures of wireway to provide electrical continuity throughout the wireway system, by connecting a No. 6 AWG bonding jumper at all intermediate metallic enclosures and across all section junctions.
2. Install insulated No. 6 AWG bonding jumpers between the wireway system, bonded as required above, and the closest building ground at each end and approximately every 16 M (50 feet).
3. Use insulated No. 6 AWG bonding jumpers to ground or bond metallic wireway at each end for all intermediate metallic enclosures and across all section junctions.
4. Use insulated No. 6 AWG bonding jumpers to ground cable tray to column-mounted building ground plates (pads) at each end and approximately every 15 M (49 feet).

E. Receptacles shall not be grounded through their mounting screws. Ground receptacles with a jumper from the receptacle green ground terminal to the device box ground screw and a jumper to the branch circuit equipment grounding conductor.

F. Ground lighting fixtures to the equipment grounding conductor of the wiring system. Fixtures connected with flexible conduit shall have a green ground wire included with the power wires from the fixture through the flexible conduit to the first outlet box.

G. Fixed electrical appliances and equipment shall be provided with a ground lug for termination of the equipment grounding conductor.

- H. Panelboard Bonding in Patient Care Areas: The equipment grounding terminal buses of the normal and essential branch circuit panel boards serving the same individual patient vicinity shall be bonded together with an insulated continuous copper conductor not less than No. 10 AWG, installed in rigid metal conduit.

3.6 CORROSION INHIBITORS

- A. When making grounding and bonding connections, apply a corrosion inhibitor to all contact surfaces. Use corrosion inhibitor appropriate for protecting a connection between the metals used.

3.7 CONDUCTIVE PIPING

- A. Bond all conductive piping systems, interior and exterior, to the grounding electrode system. Bonding connections shall be made as close as practical to the equipment ground bus.
- B. In operating rooms and at intensive care and coronary care type beds, bond the medical gas piping and medical vacuum piping at the outlets directly to the patient ground bus.

3.8 ACCEPTANCE CHECKS AND TESTS

- A. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.

---END---

SECTION 26 05 33
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies the furnishing, installation, and connection of conduit, fittings, and boxes, to form complete, coordinated, grounded raceway systems. Raceways are required for all wiring unless shown or specified otherwise.
- B. Definitions: The term conduit, as used in this specification, shall mean any or all of the raceway types specified.

1.2 RELATED WORK:

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements and items that are common to more than one section of Division 26.
- B. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

1.3 QUALITY ASSURANCE:

- A. Refer to Paragraph, QUALIFICATIONS, in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS:

- A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
 - 1. Shop Drawings:
 - a. Size and location of main feeders.
 - b. Size and location of panels and pull-boxes.
 - c. Layout of required conduit penetrations through structural elements.
 - d. Submit the following data for approval:
 - 1) Raceway types and sizes.
 - 2) Conduit bodies, connectors and fittings.
 - 3) Junction and pull boxes, types and sizes.
 - 2. Certifications: Two weeks prior to final inspection, submit the following:
 - a. Certification by the manufacturer that raceways, conduits, conduit bodies, connectors, fittings, junction and pull boxes, and all related equipment conform to the requirements of the drawings and specifications.
 - b. Certification by the Contractor that raceways, conduits, conduit bodies, connectors, fittings, junction and pull boxes, and all related equipment have been properly installed.

1.5 APPLICABLE PUBLICATIONS:

- A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.
- B. American National Standards Institute (ANSI):
 - 1. C80.1-05 Electrical Rigid Steel Conduit
 - 2. C80.3-05 Steel Electrical Metal Tubing
 - 3. C80.6-05 Electrical Intermediate Metal Conduit
- C. National Fire Protection Association (NFPA):
 - 1. 70-11 National Electrical Code (NEC)
- D. Underwriters Laboratories, Inc. (UL):
 - 1. 1-05 Flexible Metal Conduit
 - 2. 5-11 Surface Metal Raceway and Fittings
 - 3. 6-07 Electrical Rigid Metal Conduit - Steel
 - 4. 50-95 Enclosures for Electrical Equipment
 - 5. 360-13 Liquid-Tight Flexible Steel Conduit
 - 6. 467-13 Grounding and Bonding Equipment
 - 7. 514A-13 Metallic Outlet Boxes
 - 8. 514B-12 Conduit, Tubing, and Cable Fittings
 - 9. 514C-07 Nonmetallic Outlet Boxes, Flush-Device Boxes and Covers
 - 10. 651-11 Schedule 40 and 80 Rigid PVC Conduit and Fittings
 - 11. 651A-11 Type EB and A Rigid PVC Conduit and HDPE Conduit
 - 12. 797-07 Electrical Metallic Tubing
 - 13. 1242-06 Electrical Intermediate Metal Conduit - Steel
- E. National Electrical Manufacturers Association (NEMA):
 - 1. TC-2-13 Electrical Polyvinyl Chloride (PVC) Tubing and Conduit
 - 2. TC-3-13 PVC Fittings for Use with Rigid PVC Conduit and Tubing
 - 3. FB1-12 Fittings, Cast Metal Boxes and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable
 - 4. FB2.10-13 Selection and Installation Guidelines for Fittings for use with Non-Flexible Conduit or Tubing (Rigid Metal Conduit, Intermediate Metallic Conduit, and Electrical Metallic Tubing)
 - 5. FB2.20-12 Selection and Installation Guidelines for Fittings for use with Flexible Electrical Conduit and Cable
- F. American Iron and Steel Institute (AISI):
 - 1. S100-2007 North American Specification for the Design of Cold-Formed Steel Structural Members

PART 2 - PRODUCTS

2.1 MATERIAL:

- A. Conduit Size: In accordance with the NEC, but not less than 13 mm (0.5-inch) unless otherwise shown. Where permitted by the NEC, 13 mm (0.5-inch) flexible conduit may be used for tap connections to recessed lighting fixtures.
- B. Conduit:
 - 1. Size: In accordance with the NEC, but not less than 13 mm (0.5-inch).
 - 2. Rigid Steel Conduit (RMC): Shall conform to UL 6 and ANSI C80.1.
 - 3. Rigid aluminum: Shall conform to UL 6A and ANSI C80.5.
 - 4. Rigid Intermediate Steel Conduit (IMC): Shall conform to UL 1242 and ANSI C80.6.
 - 5. Electrical Metallic Tubing (EMT): Shall conform to UL 797 and ANSI C80.3. Maximum size not to exceed 105 mm (4 inches) and shall be permitted only with cable rated 600 V or less.
 - 6. Flexible Metal Conduit: Shall conform to UL 1.
 - 7. Liquid-tight Flexible Metal Conduit: Shall conform to UL 360.
 - 8. Direct Burial Plastic Conduit: Shall conform to UL 651 and UL 651A, heavy wall PVC or high density polyethylene (PE).
 - 9. Surface Metal Raceway: Shall conform to UL 5.
- C. Conduit Fittings:
 - 1. Rigid Steel and Intermediate Metallic Conduit Fittings:
 - a. Fittings shall meet the requirements of UL 514B and NEMA FB1.
 - b. Standard threaded couplings, locknuts, bushings, conduit bodies, and elbows: Only steel or malleable iron materials are acceptable. Integral retractable type IMC couplings are also acceptable.
 - c. Locknuts: Bonding type with sharp edges for digging into the metal wall of an enclosure.
 - d. Bushings: Metallic insulating type, consisting of an insulating insert, molded or locked into the metallic body of the fitting. Bushings made entirely of metal or nonmetallic material are not permitted.
 - e. Erickson (Union Type) and Set Screw Type Couplings: Approved for use in concrete are permitted for use to complete a conduit run where conduit is installed in concrete. Use set screws of case-hardened steel with hex head and cup point to firmly seat in conduit wall for positive ground. Tightening of set screws with pliers is prohibited.
 - f. Sealing Fittings: Threaded cast iron type. Use continuous drain-type sealing fittings to prevent passage of water vapor. In concealed work, install fittings in flush steel boxes with blank cover plates having the same finishes as that of other electrical plates in the room.
 - 2. Rigid Aluminum Conduit Fittings:

- a. Standard threaded couplings, locknuts, bushings, conduit bodies, and elbows: Malleable iron, steel or aluminum alloy materials; Zinc or cadmium plate iron or steel fittings. Aluminum fittings containing more than 0.4% copper are prohibited.
- b. Locknuts and Bushings: As specified for rigid steel and IMC conduit.
- c. Set Screw Fittings: Not permitted for use with aluminum conduit.
- 3. Electrical Metallic Tubing Fittings:
 - a. Fittings and conduit bodies shall meet the requirements of UL 514B, ANSI C80.3, and NEMA FB1.
 - b. Only steel or malleable iron materials are acceptable.
 - c. Compression Couplings and Connectors: Concrete-tight and rain-tight, with connectors having insulated throats.
 - d. Setscrew Couplings and Connectors: Use setscrews of case-hardened steel with hex head and cup point, to firmly seat in wall of conduit for positive grounding.
 - e. Indent-type connectors or couplings are prohibited.
 - f. Die-cast or pressure-cast zinc-alloy fittings or fittings made of "pot metal" are prohibited.
- 4. Flexible Metal Conduit Fittings:
 - a. Conform to UL 514B. Only steel or malleable iron materials are acceptable.
 - b. Clamp-type, with insulated throat.
- 5. Liquid tight Flexible Metal Conduit Fittings:
 - a. Fittings shall meet the requirements of UL 514B and NEMA FB1.
 - b. Only steel or malleable iron materials are acceptable.
 - c. Fittings must incorporate a threaded grounding cone, a steel or plastic compression ring, and a gland for tightening. Connectors shall have insulated throats.
- 6. Direct Burial Plastic Conduit Fittings: Fittings shall meet the requirements of UL 514C and NEMA TC3.
- 7. Surface Metal Raceway Fittings: As recommended by the raceway manufacturer. Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, conduit entry fittings, accessories, and other fittings as required for complete system.
- 8. Expansion and Deflection Couplings:
 - a. Conform to UL 467 and UL 514B.
 - b. Accommodate a 19 mm (0.75-inch) deflection, expansion, or contraction in any direction, and allow 30 degree angular deflections.
 - c. Include internal flexible metal braid, sized to guarantee conduit ground continuity and a low-impedance path for fault currents, in accordance with UL 467 and the NEC tables for equipment grounding conductors.

- d. Jacket: Flexible, corrosion resistant, watertight, moisture and heat-resistant molded rubber material with stainless steel jacket clamps.
- D. Conduit Supports:
 - 1. Parts and Hardware: Zinc coat or provide equivalent corrosion protection.
 - 2. Individual Conduit Hangers: Designed for the purpose, having a pre-assembled closure bolt and nut, and provisions for receiving a hanger rod.
 - 3. Multiple Conduit (Trapeze) Hangers: Not less than 38 mm x 38 mm (1.5 x 1.5 inches), 12-gauge steel, cold-formed, lipped channels; with not less than 9 mm (0.375-inch) diameter steel hanger rods.
 - 4. Solid Masonry and Concrete Anchors: Self drilling expansion shields, or machine bolt expansion.
- E. Outlet, Junction, and Pull Boxes:
 - 1. UL-50 and UL-514A.
 - 2. Rustproof cast metal where required by the NEC or shown on drawings.
 - 3. Sheet Metal Boxes: Galvanized steel, except where shown on drawings.
- F. Metal Wireways: Equip with hinged covers, except as shown on drawings. Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for a complete system.

PART 3 - EXECUTION

3.1 PENETRATIONS:

- A. Cutting or Holes:
 - 1. Cut holes in advance where they should be placed in the structural elements, such as ribs or beams. Obtain the approval of the COR prior to drilling through structural elements.
 - 2. Cut holes through concrete and masonry in new and existing structures with a diamond core drill or concrete saw. Pneumatic hammers, impact electric, hand, or manual hammer-type drills are not allowed, except when permitted by the COR where working space is limited.
- B. Firestop: Where conduits, wireways, and other electrical raceways pass through fire partitions, fire walls, smoke partitions, or floors, install a fire stop that provides an effective barrier against the spread of fire, smoke and gases.
- C. Waterproofing: At floor, exterior wall, and roof conduit penetrations, completely seal the gap around conduit to render it watertight.

3.2 INSTALLATION, GENERAL:

- A. In accordance with UL, NEC, NEMA, as shown on drawings, and as specified herein.

- B. Raceway systems used for Essential Electrical Systems (EES) shall be entirely independent of other raceway systems.
- C. Install conduit as follows:
1. In complete mechanically and electrically continuous runs before pulling in cables or wires.
 2. Unless otherwise indicated on the drawings or specified herein, installation of all conduits shall be concealed within finished walls, floors, and ceilings.
 3. Flattened, dented, or deformed conduit is not permitted. Remove and replace the damaged conduits with new conduits.
 4. Assure conduit installation does not encroach into the ceiling height head room, walkways, or doorways.
 5. Cut conduits square, ream, remove burrs, and draw up tight.
 6. Independently support conduit at 2.4 M (8 feet) on centers with specified materials and as shown on drawings.
 7. Do not use suspended ceilings, suspended ceiling supporting members, lighting fixtures, other conduits, cable tray, boxes, piping, or ducts to support conduits and conduit runs.
 8. Support within 300 mm (12 inches) of changes of direction, and within 300 mm (12 inches) of each enclosure to which connected.
 9. Close ends of empty conduits with plugs or caps at the rough in stage until wires are pulled in, to prevent entry of debris.
 10. Conduit installations under fume and vent hoods are prohibited.
 11. Secure conduits to cabinets, junction boxes, pull-boxes, and outlet boxes with bonding type locknuts. For rigid steel and IMC conduit installations, provide a locknut on the inside of the enclosure, made up wrench tight. Do not make conduit connections to junction box covers.
 12. Flashing of penetrations of the roof membrane.
 13. Conduit bodies shall only be used for changes in direction, and shall not contain splices.
 14. Do not use aluminum conduits in wet locations.
- D. Conduit Bends:
1. Make bends with standard conduit bending machines.
 2. Conduit hickey may be used for slight offsets and for straightening stubbed out conduits.
 3. Bending of conduits with a pipe tee or vise is prohibited.
- E. Layout and Homeruns:
1. Install conduit with wiring, including homeruns, as shown on drawings.
 2. Deviations: Make only where necessary to avoid interferences and only after drawings showing the proposed deviations have been submitted and approved by the COR.

3.3 CONCEALED WORK INSTALLATION:

A. In Concrete:

1. Conduit: Rigid steel, IMC, or EMT. Do not install EMT in concrete slabs that are in contact with soil, gravel, or vapor barriers.
2. Align and run conduit in direct lines.
3. Install conduit through concrete beams only:
 - a. Where shown on the structural drawings.
 - b. As approved by the COR prior to construction, and after submittal of drawing showing location, size, and position of each penetration.
4. Installation of conduit in concrete that is less than 75 mm (3 inches) thick is prohibited.
 - a. Conduit outside diameter larger than one-third of the slab thickness is prohibited.
 - b. Space between conduits in slabs: Approximately six conduit diameters apart, and one conduit diameter at conduit crossings.
 - c. Install conduits approximately in the center of the slab so that there will be a minimum of 19 mm (0.75-inch) of concrete around the conduits.
5. Make couplings and connections watertight. Use thread compounds that are UL approved conductive type to ensure low resistance ground continuity through the conduits. Tightening setscrews with pliers is prohibited.

B. Above Furred or Suspended Ceilings and in Walls:

1. Conduit for Conductors Above 600 V: Rigid steel or rigid aluminum. Mixing different types of conduits in the same system is prohibited.
2. Conduit for Conductors 600 V and Below: Rigid steel, IMC, rigid aluminum, or EMT. Mixing different types of conduits in the same system is prohibited.
3. Align and run conduit parallel or perpendicular to the building lines.
4. Connect recessed lighting fixtures to conduit runs with maximum 1.8 M (6 feet) of flexible metal conduit extending from a junction box to the fixture.
5. Tightening set screws with pliers is prohibited.
6. For conduits running through metal studs, limit field cut holes to no more than 70% of web depth. Spacing between holes shall be at least 457 mm (18 inches). Cuts or notches in flanges or return lips shall not be permitted.

3.4 EXPOSED WORK INSTALLATION:

- A. Unless otherwise indicated on drawings, exposed conduit is only permitted in mechanical and electrical rooms.
- B. Conduit for Conductors Above 600 V: Rigid steel or rigid aluminum. Mixing different types of conduits in the system is prohibited.

- C. Conduit for Conductors 600 V and Below: Rigid steel, IMC, rigid aluminum, or EMT. Mixing different types of conduits in the system is prohibited.
- D. Align and run conduit parallel or perpendicular to the building lines.
- E. Install horizontal runs close to the ceiling or beams and secure with conduit straps.
- F. Support horizontal or vertical runs at not over 2.4 M (8 feet) intervals.
- G. Surface Metal Raceways: Use only where shown on drawings.
- H. Painting:
 - 1. Paint exposed conduit.
 - 2. Paint all conduits containing cables rated over 600 V safety orange. In addition, paint legends, using 50 mm (2 inch) high black numerals and letters, showing the cable voltage rating. Provide legends where conduits pass through walls and floors and at maximum 6 M (20 feet) intervals in between.

3.5 HAZARDOUS LOCATIONS:

- A. Use rigid steel conduit only.
- B. Install UL approved sealing fittings that prevent passage of explosive vapors in hazardous areas equipped with explosion-proof lighting fixtures, switches, and receptacles, as required by the NEC.

3.6 WET OR DAMP LOCATIONS:

- A. Use rigid steel or IMC conduits unless as shown on drawings.
- B. Provide sealing fittings to prevent passage of water vapor where conduits pass from warm to cold locations, i.e., refrigerated spaces, constant-temperature rooms, air-conditioned spaces, building exterior walls, roofs, or similar spaces.
- C. Use rigid steel or IMC conduit within 1.5 M (5 feet) of the exterior and below concrete building slabs in contact with soil, gravel, or vapor barriers, unless as shown on drawings. Conduit shall be half-lapped with 10 mil PVC tape before installation. After installation, completely recoat or retape any damaged areas of coating.
- D. Conduits run on roof shall be supported with integral galvanized lipped steel channel, attached to UV-inhibited polycarbonate or polypropylene blocks every 2.4 M (8 feet) with 9 mm (3/8-inch) galvanized threaded rods, square washer and locknut. Conduits shall be attached to steel channel with conduit clamps.

3.7 MOTORS AND VIBRATING EQUIPMENT:

- A. Use flexible metal conduit for connections to motors and other electrical equipment subject to movement, vibration, misalignment, cramped quarters, or noise transmission.
- B. Use liquid tight flexible metal conduit for installation in exterior locations, moisture or humidity laden atmosphere, corrosive atmosphere, water or spray wash down operations, inside airstream of HVAC units, and locations subject to seepage or dripping of oil, grease, or water.

- C. Provide a green equipment grounding conductor with flexible and liquid-tight flexible metal conduit.

3.8 EXPANSION JOINTS:

- A. Conduits 75 mm (3 inch) and larger that are secured to the building structure on opposite sides of a building expansion joint require expansion and deflection couplings. Install the couplings in accordance with the manufacturer's recommendations.
- B. Provide conduits smaller than 75 mm (3 inch) with junction boxes on both sides of the expansion joint. Connect flexible metal conduits to junction boxes with sufficient slack to produce a 125 mm (5 inch) vertical drop midway between the ends of the flexible metal conduit. Flexible metal conduit shall have a green insulated copper bonding jumper installed. In lieu of this flexible metal conduit, expansion and deflection couplings as specified above are acceptable.
- C. Install expansion and deflection couplings where shown.
- D. Seismic Areas: In seismic areas, provide conduits rigidly secured to the building structure on opposite sides of a building expansion joint with junction boxes on both sides of the joint. Connect conduits to junction boxes with 375 mm (15 inches) of slack flexible conduit. Flexible conduit shall have a copper bonding jumper installed.

3.9 CONDUIT SUPPORTS:

- A. Safe working load shall not exceed one-quarter of proof test load of fastening devices.
- B. Use pipe straps or individual conduit hangers for supporting individual conduits.
- C. Support multiple conduit runs with trapeze hangers. Use trapeze hangers that are designed to support a load equal to or greater than the sum of the weights of the conduits, wires, hanger itself, and an additional 90 kg (200 lbs). Attach each conduit with U bolts or other approved fasteners.
- D. Support conduit independently of junction boxes, pull-boxes, fixtures, suspended ceiling T bars, angle supports, and similar items.
- E. Fasteners and Supports in Solid Masonry and Concrete:
 - 1. New Construction: Use steel or malleable iron concrete inserts set in place prior to placing the concrete.
 - 2. Existing Construction:
 - a. Steel expansion anchors not less than 6 mm (0.25-inch) bolt size and not less than 28 mm (1.125 inch) in embedment.
 - b. Power set fasteners not less than 6 mm (0.25-inch) diameter with depth of penetration not less than 75 mm (3 inch).
 - c. Use vibration and shock-resistant anchors and fasteners for attaching to concrete ceilings.
- F. Hollow Masonry: Toggle bolts.
- G. Bolts supported only by plaster or gypsum wallboard are not acceptable.

- H. Metal Structures: Use machine screw fasteners or other devices specifically designed and approved for the application.
- I. Attachment by wood plugs, rawl plug, plastic, lead or soft metal anchors, or wood blocking and bolts supported only by plaster is prohibited.
- J. Chain, wire, or perforated strap shall not be used to support or fasten conduit.
- K. Spring steel type supports or fasteners are prohibited for all uses except horizontal and vertical supports/fasteners within walls.
- L. Vertical Supports: Vertical conduit runs shall have riser clamps and supports in accordance with the NEC and as shown. Provide supports for cable and wire with fittings that include internal wedges and retaining collars.

3.10 BOX INSTALLATION:

- A. Boxes for Concealed Conduits:
 - 1. Flush-mounted.
 - 2. Provide raised covers for boxes to suit the wall or ceiling, construction, and finish.
- B. In addition to boxes shown, install additional boxes where needed to prevent damage to cables and wires during pulling-in operations or where more than the equivalent of 4-90 degree bends are necessary.
- C. Locate pullboxes so that covers are accessible and easily removed. Coordinate locations with piping and ductwork where installed above ceilings.
- D. Remove only knockouts as required. Plug unused openings. Use threaded plugs for cast metal boxes and snap in metal covers for sheet metal boxes.
- E. Outlet boxes mounted back to back in the same wall are prohibited. A minimum 600 mm (24 inch) center-to-center lateral spacing shall be maintained between boxes.
- F. Flush-mounted wall or ceiling boxes shall be installed with raised covers so that the front face of raised cover is flush with the wall. Surface-mounted wall or ceiling boxes shall be installed with surface-style flat or raised covers.
- G. Minimum size of outlet boxes for ground fault circuit interrupter (GFCI) receptacles is 100 mm (4 inches) square x 55 mm (2.125 inches) deep, with device covers for the wall material and thickness involved.
- H. Stencil or install phenolic nameplates on covers of the boxes identified on riser diagrams; for example "SIG FA JB No. 1."
- I. On all branch circuit junction box covers, identify the circuits with black marker.

- - - E N D - - -

SECTION 26 05 41
UNDERGROUND ELECTRICAL CONSTRUCTION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the furnishing, installation, and connection of underground ducts and raceways, and precast manholes and pullboxes to form a complete underground electrical raceway system.
- B. The terms "duct" and "conduit" are used interchangeably in this section.

1.2 RELATED WORK

- B. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS:
Requirements that apply to all sections of Division 26.
- C. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS:
Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

1.3 QUALITY ASSURANCE

- A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES), in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
- B. Coordinate layout and installation of ducts, manholes, and pullboxes with final arrangement of other utilities, site grading, and surface features.

1.4 SUBMITTALS

- A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
 - 1. Shop Drawings:
 - a. Submit sufficient information to demonstrate compliance with drawings and specifications.
 - b. Submit information on manholes, pullboxes, ducts, and hardware. Submit manhole plan and elevation drawings, showing openings, pulling irons, cable supports, cover, ladder, sump, and other accessories.
 - c. Proposed deviations from the drawings shall be clearly marked on the submittals. If it is necessary to locate manholes, pullboxes, or duct banks at locations other than shown on the drawings, show the proposed locations accurately on scaled site drawings, and submit to the COR for approval prior to construction.

2. Certifications: Two weeks prior to the final inspection, submit the following.

- a. Certification by the manufacturer that the materials conform to the requirements of the drawings and specifications.
- b. Certification by the Contractor that the materials have been properly installed, connected, and tested.

1.5 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.
- B. American Concrete Institute (ACI):
 - Building Code Requirements for Structural Concrete
 - 318-11/318M-11.....Building Code Requirements for Structural Concrete & Commentary
 - SP-66-04.....ACI Detailing Manual
- C. American National Standards Institute (ANSI):
 - 77-10.....Underground Enclosure Integrity
- D. American Society for Testing and Materials (ASTM):
 - C478-12.....Standard Specification for Precast Reinforced Concrete Manhole Sections
 - C858-10e1.....Underground Precast Concrete Utility Structures
 - C990-09.....Joints for Concrete Pipe, Manholes and Precast Box Sections Using Preformed Flexible Joint Sealants.
- E. National Electrical Manufacturers Association (NEMA):
 - TC 2-03.....Electrical Polyvinyl Chloride (PVC) Conduit
 - TC 3-04.....Polyvinyl Chloride (PVC) Fittings for Use With Rigid PVC Conduit And Tubing
 - TC 6 & 8-03.....Polyvinyl Chloride (PVC) Plastic Utilities Duct For Underground Installations
 - TC 9-04.....Fittings For Polyvinyl Chloride (PVC) Plastic Utilities Duct For Underground Installation
- F. National Fire Protection Association (NFPA):
 - 70-11.....National Electrical Code (NEC)
 - 70E-12.....National Electrical Safety Code
- G. Underwriters Laboratories, Inc. (UL):

6-07.....Electrical Rigid Metal Conduit-Steel
467-07.....Grounding and Bonding Equipment
651-11.....Schedule 40, 80, Type EB and A Rigid PVC
 Conduit and Fittings
651A-11.....Schedule 40 and 80 High Density Polyethylene
 (HDPE) Conduit
651B-07.....Continuous Length HDPE Conduit

PART 2 - PRODUCTS

2.1 PULLBOXES

- A. General: Size as indicated on the drawings. Provide pullboxes with weatherproof, non-skid covers with recessed hook eyes, secured with corrosion- and tamper-resistant hardware. Cover material shall be identical to pullbox material. Covers shall have molded lettering, ELECTRIC or SIGNAL as applicable. Pullboxes shall comply with the requirements of ANSI 77 loading. Provide pulling irons, 22 mm (0.875 inch) diameter galvanized steel bar with exposed triangular-shaped opening.
- B. Polymer Concrete Pullboxes: Shall be molded of sand, aggregate, and polymer resin, and reinforced with steel, fiberglass, or both. Pullbox shall have open bottom.

2.2 Ducts

- A. Number and sizes shall be as shown on the drawings.
- B. Ducts (concrete-encased):
 - 1. Plastic Duct:
 - a. UL 651 and 651A Schedule 40 PVC conduit.
 - b. Duct shall be suitable for use with 90° C (194° F) rated conductors.
 - 2. Conduit Spacers: Prefabricated plastic.
- C. Ducts (direct-burial):
 - 1. Plastic duct:
 - a. Schedule 80 PVC or HDPE conduit.
 - b. Duct shall be suitable for use with 75° C (167° F) rated conductors.
 - 2. Rigid metal conduit: UL6 and NEMA RN1 galvanized rigid metal, half-lap wrapped with 10 mil PVC tape.

2.3 GROUNDING

- A. Ground Rods and Ground Wire: Per Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

2.4 WARNING TAPE

- A. 4-mil polyethylene 75 mm (3 inches) wide detectable tape, red with black letters, imprinted with "CAUTION - BURIED ELECTRIC CABLE BELOW" or similar.

2.5 PULL ROPE FOR SPARE DUCTS

- A. Plastic with 890 N (200 lb) minimum tensile strength.

PART 3 - EXECUTION

3.1 MANHOLE AND PULLBOX INSTALLATION

- A. Assembly and installation shall be per the requirements of the manufacturer.
1. Install manholes and pullboxes level and plumb.
 2. Units shall be installed on a 300 mm (12 inches) thick level bed of 90% compacted granular fill, well-graded from the 25 mm (1 inches) sieve to the No. 4 sieve. Granular fill shall be compacted with a minimum of four passes with a plate compactor.
- B. Access: Ensure the top of frames and covers are flush with finished grade.
- C. Grounding in Manholes:
1. Ground Rods in Manholes: Drive a ground rod into the earth, through the floor sleeve, after the manhole is set in place. Fill the sleeve with sealant to make a watertight seal. Rods shall protrude approximately 100 mm (4 inches) above the manhole floor.
 2. Install a No. 3/0 AWG bare copper ring grounding conductor around the inside perimeter of the manhole and anchor to the walls with metallic cable clips.
 3. Connect the ring grounding conductor to the ground rod by an exothermic welding process.
 4. Bond the ring grounding conductor to the duct bank equipment grounding conductors, the exposed non-current carrying metal parts of racks, sump covers, and like items in the manholes with a minimum No. 6 AWG bare copper jumper using an exothermic welding process.

3.2 TRENCHING

- A. Provide trenching, backfilling, and compaction.

- B. Before performing trenching work at existing facilities, a Ground Penetrating Radar Survey shall be carefully performed by a certified technician to reveal all existing underground ducts, conduits, cables, and other utility systems.
- C. Work with extreme care near existing ducts, conduits, and other utilities to avoid damaging them.
- D. Cut the trenches neatly and uniformly.
- E. For Concrete-Encased Ducts:
 - 1. After excavation of the trench, stakes shall be driven in the bottom of the trench at 1.2 M (4 foot) intervals to establish the grade and route of the duct bank.
 - 2. Pitch the trenches uniformly toward manholes or both ways from high points between manholes for the required duct line drainage. Avoid pitching the ducts toward buildings wherever possible.
 - 3. The walls of the trench may be used to form the side walls of the duct bank, provided that the soil is self-supporting and that the concrete envelope can be poured without soil inclusions. Forms are required where the soil is not self-supporting.
 - 4. After the concrete-encased duct has sufficiently cured, the trench shall be backfilled to grade with earth, and appropriate warning tape installed.
- F. Individual conduits to be installed under existing paved areas and roads that cannot be disturbed shall be jacked into place using rigid metal conduit, or bored using plastic utilities duct or PVC conduit, as approved by the COR.

3.3 DUCT INSTALLATION

- A. General Requirements:
 - 1. Ducts shall be in accordance with the NEC, as shown on the drawings, and as specified.
 - 2. Join and terminate ducts with fittings recommended by the manufacturer.
 - 3. Slope ducts to drain towards manholes and pullboxes, and away from building and equipment entrances. Pitch not less than 100 mm (4 inch) in 30 M (100 feet).
 - 4. Underground conduit stub-ups and sweeps to equipment inside of buildings shall be galvanized rigid metal conduit half-lap wrapped with PVC tape, and shall extend a minimum of 1.5 M (5 feet) outside

- the building foundation. Tops of conduits below building slab shall be minimum 610 mm (24 inches) below bottom of slab.
5. Stub-ups and sweeps to equipment mounted on outdoor concrete slabs shall be galvanized rigid metal conduit half-lap wrapped with PVC tape, and shall extend a minimum of 1.5 M (5 feet) away from the edge of slab.
 6. Install insulated grounding bushings on the conduit terminations.
 7. Radius for sweeps shall be sufficient to accomplish pulls without damage. Minimum radius shall be six times conduit diameter.
 8. All multiple conduit runs shall have conduit spacers. Spacers shall securely support and maintain uniform spacing of the duct assembly a minimum of 75 mm (3 inches) above the bottom of the trench during the concrete pour. Spacer spacing shall not exceed 1.5 M (5 feet). Secure spacers to ducts and earth to prevent floating during concrete pour. Provide nonferrous tie wires to prevent displacement of the ducts during concrete pour. Tie wires shall not act as substitute for spacers.
 9. Duct lines shall be installed no less than 300 mm (12 inches) from other utility systems, such as water, sewer, chilled water.
 10. Clearances between individual ducts:
 - a. For similar services, not less than 75 mm (3 inches).
 - b. For power and signal services, not less than 150 mm (6 inches).
 11. Duct lines shall terminate at window openings in manhole walls as shown on the drawings. All ducts shall be fitted with end bells.
 12. Couple the ducts with proper couplings. Stagger couplings in rows and layers to ensure maximum strength and rigidity of the duct bank.
 13. Keep ducts clean of earth, sand, or gravel, and seal with tapered plugs upon completion of each portion of the work.
 14. Spare Ducts: Where spare ducts are shown, they shall have a nylon pull rope installed. They shall be capped at each end and labeled as to location of the other end.
 15. Duct Identification: Place continuous strip of warning tape approximately 300 mm (12 inches) above ducts before backfilling trenches. Warning tape shall be preprinted with proper identification.
 16. Duct Sealing: Seal ducts, including spare ducts, at building entrances and at outdoor terminations for equipment, with a suitable

non-hardening compound to prevent the entrance of foreign objects and material, moisture, and gases.

17. Use plastic ties to secure cables to insulators on cable arms. Use minimum two ties per cable per insulator.

B. Concrete-Encased Ducts:

1. Install concrete-encased ducts for medium-voltage systems, low-voltage systems, and signal systems, unless otherwise shown on the drawings.
2. Duct banks shall be single or multiple duct assemblies encased in concrete. Ducts shall be uniform in size and material throughout the installation.
3. Tops of concrete-encased ducts shall be:
 - a. Not less than 600 mm (24 inches) and not less than shown on the drawings, below finished grade.
 - b. Not less than 750 mm (30 inches) and not less than shown on the drawings, below roads and other paved surfaces.
 - c. Additional burial depth shall be required in order to accomplish NEC-required minimum bend radius of ducts.
 - d. Conduits crossing under grade slab construction joints shall be installed a minimum of 1.2 M (4 feet) below slab.
4. Extend the concrete envelope encasing the ducts not less than 75 mm (3 inches) beyond the outside walls of the outer ducts.
5. Within 3 M (10 feet) of building and manhole wall penetrations, install reinforcing steel bars at the top and bottom of each concrete envelope to provide protection against vertical shearing.
6. Install reinforcing steel bars at the top and bottom of each concrete envelope of all ducts underneath roadways and parking areas.
7. Where new ducts and concrete envelopes are to be joined to existing manholes, pullboxes, ducts, and concrete envelopes, make the joints with the proper fittings and fabricate the concrete envelopes to ensure smooth durable transitions.
8. Duct joints in concrete may be placed side by side horizontally, but shall be staggered at least 150 mm (6 inches) vertically.
9. Pour each run of concrete envelope between manholes or other terminations in one continuous pour. If more than one pour is necessary, terminate each pour in a vertical plane and install 19 mm

(0.75 inch) reinforcing rod dowels extending 450 mm (18 inches) into concrete on both sides of joint near corners of envelope.

10. Pour concrete so that open spaces are uniformly filled. Do not agitate with power equipment unless approved by COR.
- C. Connections to Manholes: Ducts connecting to manholes shall be flared to have an enlarged cross-section to provide additional shear strength. Dimensions of the flared cross-section shall be larger than the corresponding manhole opening dimensions by no less than 300 mm (12 inches) in each direction. Perimeter of the duct bank opening in the manhole shall be flared toward the inside or keyed to provide a positive interlock between the duct and the wall of the manhole. Use vibrators when this portion of the encasement is poured to ensure a seal between the envelope and the wall of the structure.
- D. Connections to Existing Manholes: For duct connections to existing manholes, break the structure wall out to the dimensions required and preserve the steel in the structure wall. Cut steel and extend into the duct bank envelope. Chip the perimeter surface of the duct bank opening to form a key or flared surface, providing a positive connection with the duct bank envelope.
- E. Connections to Existing Ducts: Where connections to existing ducts are indicated, excavate around the ducts as necessary. Cut off the ducts and remove loose concrete from inside before installing new ducts. Provide a reinforced-concrete collar, poured monolithically with the new ducts, to take the shear at the joint of the duct banks.
- F. Partially-Completed Ducts: During construction, wherever a construction joint is necessary in a duct bank, prevent debris such as mud and dirt from entering ducts by providing suitable plugs. Fit concrete envelope of a partially completed ducts with reinforcing steel extending a minimum of 600 mm (2 feet) back into the envelope and a minimum of 600 mm (2 feet) beyond the end of the envelope. Provide one No. 4 bar in each corner, 75 mm (3 inches) from the edge of the envelope. Secure corner bars with two No. 3 ties, spaced approximately 300 mm (12 inches) apart. Restrain reinforcing assembly from moving during pouring of concrete.

3.4 ACCEPTANCE CHECKS AND TESTS

- A. Duct Testing and Cleaning:

1. Upon completion of the duct installation, a standard flexible mandrel shall be pulled through each duct to loosen particles of earth, sand, or foreign material left in the duct, and to test for out-of-round conditions.
2. The mandrel shall be not less than 300 mm (12 inches) long, and shall have a diameter not less than 13 mm (0.5 inch) less than the inside diameter of the duct. A brush with stiff bristles shall then be pulled through each duct to remove the loosened particles. The diameter of the brush shall be the same as, or slightly larger than, the diameter of the duct.
3. If testing reveals obstructions or out-of-round conditions, the Contractor shall replace affected section(s) of duct and retest to the satisfaction of the COR at no cost to the Government.
4. Mandrel pulls shall be witnessed by the COR

---END---

SECTION 26 24 16
PANELBOARDS

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies the furnishing, installation, and connection of panelboards.

1.2 RELATED WORK:

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.
- B. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Low-voltage conductors.
- C. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.
- D. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits.

1.3 QUALITY ASSURANCE:

- A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES), in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS:

- A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1. Shop Drawings:

- a. Submit sufficient information to demonstrate compliance with drawings and specifications.
- b. Include electrical ratings, dimensions, mounting details, materials, required clearances, terminations, weight, circuit breakers, wiring and connection diagrams, accessories, and nameplate data.
- c. Certification from the manufacturer that a representative panelboard has been seismically tested to International Building Code requirements. Certification shall be based upon simulated seismic forces on a shake table or by analytical methods, but not by
- d. with the shop drawings, complete maintenance and operating manuals including technical data sheets, wiring diagrams, and experience data or other methods.

2. Manuals:

- a. Submit, simultaneously information for ordering circuit breakers and replacement parts.
 - 1) Include schematic diagrams, with all terminals identified, matching terminal identification in the panelboards.
 - 2) Include information for testing, repair, troubleshooting, assembly, and disassembly.

- b. If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.
- 3. Certifications: Two weeks prior to final inspection, submit the following.
 - a. Certification by the manufacturer that the panelboards conform to the requirements of the drawings and specifications.
 - b. Certification by the Contractor that the panelboards have been properly installed, adjusted, and tested.

1.5 APPLICABLE PUBLICATIONS:

- A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.
- B. International Code Council (ICC):
 - 1. IBC-12 International Building Code
- C. National Electrical Manufacturers Association (NEMA):
 - 1. PB 1-11 Panelboards
 - 2. 250-08 Enclosures for Electrical Equipment (1,000V Maximum)
- D. National Fire Protection Association (NFPA):
 - 1. 70-11 National Electrical Code (NEC)
 - 2. 70E-12 Standard for Electrical Safety in the Workplace
- E. Underwriters Laboratories, Inc. (UL):
 - 1. 50-95 Enclosures for Electrical Equipment
 - 2. 67-09 Panelboards
 - 3. 489-09 Molded Case Circuit Breakers and Circuit Breaker Enclosures

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS:

- A. Panelboards shall be in accordance with NEC, NEMA, UL, as specified, and as shown on the drawings.
- B. Panelboards shall have main breaker or main lugs, bus size, voltage, phases, number of circuit breaker mounting spaces, top or bottom feed, flush or surface mounting, branch circuit breakers, and accessories as shown on the drawings.
- C. Panelboards shall be completely factory-assembled with molded case circuit breakers and integral accessories as shown on the drawings or specified herein.
- D. Non-reduced size copper bus bars, rigidly supported on molded insulators, and fabricated for bolt-on type circuit breakers.
- E. Bus bar connections to the branch circuit breakers shall be the "distributed phase" or "phase sequence" type.

- F. Mechanical lugs furnished with panelboards shall be cast, stamped, or machined metal alloys listed for use with the conductors to which they will be connected.
- G. Neutral bus shall be 100% rated, mounted on insulated supports.
- H. Grounding bus bar shall be equipped with screws or lugs for the connection of equipment grounding conductors.
- I. Bus bars shall be braced for the available short-circuit current as shown on the drawings, but not be less than 10,000 A symmetrical for 120/208 V and 120/240 V panelboards, and 14,000 A symmetrical for 277/480 V panelboards.
- J. In two-section panelboards, the main bus in each section shall be full size. The first section shall be furnished with subfeed lugs on the line side of main lugs only, or through-feed lugs for main breaker type panelboards, and have field-installed cable connections to the second section as shown on the drawings. Panelboard sections with tapped bus or crossover bus are not acceptable.
- K. Series-rated panelboards are not permitted.

2.2 ENCLOSURES AND TRIMS:

A. Enclosures:

- 1. Provide galvanized steel enclosures, with NEMA rating as shown on the drawings or as required for the environmental conditions in which installed.
- 2. Enclosures shall not have ventilating openings.
- 3. Enclosures may be of one-piece formed steel or of formed sheet steel with end and side panels welded, riveted, or bolted as required.
- 4. Provide manufacturer's standard option for prepunched knockouts on top and bottom endwalls.
- 5. Include removable inner dead front cover, independent of the panelboard cover.

B. Trims:

- 1. Hinged "door-in-door" type.
- 2. Interior hinged door with hand-operated latch or latches, as required to provide access only to circuit breaker operating handles, not to energized parts.
- 3. Outer hinged door shall be securely mounted to the panelboard enclosure with factory bolts, screws, clips, or other fasteners, requiring a key or tool for entry. Hand-operated latches are not acceptable.
- 4. Inner and outer doors shall open left to right.
- 5. Trims shall be flush or surface type as shown on the drawings.

2.3 MOLDED CASE CIRCUIT BREAKERS:

- A. Circuit breakers shall be per UL, NEC, as shown on the drawings, and as specified.

- B. Circuit breakers shall be bolt-on type.
- C. Circuit breakers shall have minimum interrupting rating as required to withstand the available fault current, but not less than:
 - 1. 120/208 V Panelboard: 10,000 A symmetrical.
 - 2. 120/240 V Panelboard: 10,000 A symmetrical.
 - 3. 277/480 V Panelboard: 14,000 A symmetrical.
- D. Circuit breakers shall have automatic, trip free, non-adjustable, inverse time, and instantaneous magnetic trips for less than 400 A frame. Circuit breakers with 400 A frames and above shall have magnetic trip, adjustable from 5x to 10x. Breaker magnetic trip setting shall be set to maximum, unless otherwise noted.
- E. Circuit breaker features shall be as follows:
 - 1. A rugged, integral housing of molded insulating material.
 - 2. Silver alloy contacts.
 - 3. Arc quenchers and phase barriers for each pole.
 - 4. Quick-make, quick-break, operating mechanisms.
 - 5. A trip element for each pole, thermal magnetic type with long time delay and instantaneous characteristics, a common trip bar for all poles and a single operator.
 - 6. Electrically and mechanically trip free.
 - 7. An operating handle which indicates closed, tripped, and open positions.
 - 8. An overload on one pole of a multi-pole breaker shall automatically cause all the poles of the breaker to open.
 - 9. Ground fault current interrupting breakers, shunt trip breakers, lighting control breakers (including accessories to switch line currents), or other accessory devices or functions shall be provided where shown on the drawings.
 - 10. For circuit breakers being added to existing panelboards, coordinate the breaker type with existing panelboards. Modify the panel directory accordingly.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Installation shall be in accordance with the manufacturer's instructions, the NEC, as shown on the drawings, and as specified.
- B. Locate panelboards so that the present and future conduits can be conveniently connected.
- C. In seismic areas, panelboards shall be adequately anchored and braced per details on structural contract drawings to withstand the seismic forces at the location where installed.

- D. Install a printed schedule of circuits in each panelboard after approval by the COR. Schedules shall reflect final load descriptions, room numbers, and room names connected to each circuit breaker. Schedules shall be printed on the panelboard directory cards and be installed in the appropriate panelboards
- E. Mount panelboards such that the maximum height of the top circuit breaker above the finished floor shall not exceed 1980 mm (78 inches).
- F. Provide blank cover for each unused circuit breaker mounting space.
- G. For panelboards located in areas accessible to the public, paint the exposed surfaces of the trims with finishes to match surrounding surfaces after the panelboards have been installed. Do not paint nameplates.
- H. Rust and scale shall be removed from the inside of existing enclosures where new interior components are to be installed. Paint inside of enclosures with rust-preventive paint before the new interior components are installed. Provide new trim. Trim shall fit tight to the enclosure.
- I. Panelboard enclosures shall not be used for conductors feeding through, spliced, or tapping off to other enclosures or devices.

3.2 ACCEPTANCE CHECKS AND TESTS:

- A. Perform in accordance with the manufacturer's recommendations. In addition, include the following:
 - 1. Visual Inspection and Tests:
 - a. Compare equipment nameplate data with specifications and approved shop drawings.
 - b. Inspect physical, electrical, and mechanical condition.
 - c. Verify appropriate anchorage and required area clearances.
 - d. Verify that circuit breaker sizes and types correspond to approved shop drawings.
 - e. To verify tightness of accessible bolted electrical connections, use the calibrated torque-wrench method or perform thermographic survey after energization.
 - f. Vacuum-clean enclosure interior. Clean enclosure exterior.

3.3 FOLLOW-UP VERIFICATION:

- A. Upon completion of acceptance checks, settings, and tests, the Contractor shall demonstrate that the panelboards are in good operating condition and properly performing the intended function.

---END---

SECTION 26 27 26
WIRING DEVICES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the furnishing, installation, connection, and testing of wiring devices.

1.2 RELATED WORK

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements that are common to more than one section of Division 26.
- B. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduit and boxes.
- C. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Cables and wiring.
- D. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path to ground for possible ground fault currents.

1.3 QUALITY ASSURANCE

- A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES), in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

- A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.5 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by basic designation only.
- B. National Fire Protection Association (NFPA):
 - 1. 70-11 National Electrical Code (NEC)
 - 2. 99-12 Health Care Facilities
- C. National Electrical Manufacturers Association (NEMA):
 - 1. WD 1-10 General Color Requirements for Wiring Devices
 - 2. WD 6-08 Wiring Devices - Dimensional Specifications
- D. Underwriter's Laboratories, Inc. (UL):
 - 1. 5-11 Surface Metal Raceways and Fittings
 - 2. 20-10 General-Use Snap Switches
 - 3. 231-07 Power Outlets

- | | | |
|----|---------|-----------------------------------|
| 4. | 467-07 | Grounding and Bonding Equipment |
| 5. | 498-07 | Attachment Plugs and Receptacles |
| 6. | 943-11 | Ground-Fault Circuit-Interrupters |
| 7. | 1449-07 | Surge Protective Devices |
| 8. | 1472-96 | Solid State Dimming Controls |

PART 2 - PRODUCTS

2.1 RECEPTACLES

- A. General: All receptacles shall comply with NEMA, NFPA, UL, and as shown on the drawings.
 - 1. Mounting straps shall be plated steel, with break-off plaster ears and shall include a self-grounding feature. Terminal screws shall be brass, brass plated or a copper alloy metal.
 - 2. Receptacles shall have provisions for back wiring with separate metal clamp type terminals (four minimum) and side wiring from four captively held binding screws.

2.2 TOGGLE SWITCHES

- A. Toggle switches shall be totally enclosed tumbler type with nylon bodies. Handles shall be ivory in color unless otherwise specified or shown on the drawings.
 - 1. Switches installed in hazardous areas shall be explosion-proof type in accordance with the NEC and as shown on the drawings.
 - 2. Shall be single unit toggle, butt contact, quiet AC type, heavy-duty general-purpose use with an integral self grounding mounting strap with break-off plaster ears and provisions for back wiring with separate metal wiring clamps and side wiring with captively held binding screws.
 - 3. Switches shall be rated 20 amperes at 120-277 Volts AC.

2.3 MANUAL DIMMING CONTROL

- A. Electronic full-wave manual slide dimmer with on/off switch and audible frequency and EMI/RFI suppression filters.
- B. Manual dimming controls shall be fully compatible with fluorescent electronic dimming ballasts and approved by the ballast manufacturer, LED dimming driver and be approved by the driver manufacturer, shall operate over full specified dimming range, and shall not degrade the performance or rated life of the electronic dimming ballast and lamp.
- C. Provide single-pole or three-way, as shown on the drawings.
- D. Manual dimming control and faceplates shall be ivory in color unless otherwise specified.

2.4 WALL PLATES

- A. Wall plates for switches and receptacles shall be type 302 stainless steel. Oversize plates are not acceptable.

- B. Color shall be ivory unless otherwise specified.
- C. For receptacles or switches mounted adjacent to each other, wall plates shall be common for each group of receptacles or switches.
- D. In areas requiring tamperproof wiring devices, wall plates shall be type 302 stainless steel, and shall have tamperproof screws and beveled edges.

2.5 SURFACE MULTIPLE-OUTLET ASSEMBLIES

- A. Shall have the following features:
 - 1. Enclosures:
 - a. Thickness of steel shall be not less than 1 mm (0.040 inch) for base and cover. Nominal dimensions shall be 40 mm x 70 mm (1-1/2 inches by 2-3/4 inches) with inside cross sectional area not less than 2250 square mm (3-1/2 square inches). The enclosures shall be thoroughly cleaned, phosphatized, and painted at the factory with primer and the manufacturer's standard baked enamel finish.
 - 2. Receptacles shall be duplex, hospital grade. See paragraph 'RECEPTACLES' in this Section. Device cover plates shall be the manufacturer's standard corrosion resistant finish and shall not exceed the dimensions of the enclosure.
 - 3. Unless otherwise shown on drawings, receptacle spacing shall be 600 mm (24 inches) on centers.
 - 4. Conductors shall be as specified in Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLE.
 - 5. Installation fittings shall be the manufacturer's standard bends, offsets, device brackets, inside couplings, wire clips, elbows, and other components as required for a complete system.
 - 6. Bond the assemblies to the branch circuit conduit system.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation shall be in accordance with the NEC and as shown as on the drawings.
- B. Install wiring devices after wall construction and painting is complete.
- C. The ground terminal of each wiring device shall be bonded to the outlet box with an approved green bonding jumper, and also connected to the branch circuit equipment grounding conductor.
- D. Outlet boxes for toggle switches and manual dimming controls shall be mounted on the strike side of doors.
 - 1. Provide barriers in multigang outlet boxes to comply with the NEC.
- E. Coordinate the electrical work with the work of other trades to ensure that wiring device flush outlets are positioned with box openings aligned with the face of the surrounding finish material. Pay special attention to installations in cabinet work, and in connection with laboratory equipment.

- F. Exact field locations of floors, walls, partitions, doors, windows, and equipment may vary from locations shown on the drawings. Prior to locating sleeves, boxes and chases for roughing-in of conduit and equipment, the Contractor shall coordinate exact field location of the above items with other trades.
- G. Install wall switches 1.2 M (48 inches) above floor, with the toggle OFF position down.
- H. Install wall dimmers 1.2 M (48 inches) above floor.
- I. Install receptacles 450 mm (18 inches) above floor, and 152 mm (6 inches) above counter backsplash or workbenches. Install specific-use receptacles at heights shown on the drawings.
- J. Install vertically mounted receptacles with the ground pin up. Install horizontally mounted receptacles with the ground pin to the right.
- K. When required or recommended by the manufacturer, use a torque screwdriver. Tighten unused terminal screws.
- L. Label device plates with a permanent adhesive label listing panel and circuit feeding the wiring device.

3.2 ACCEPTANCE CHECKS AND TESTS

- A. Perform manufacturer's required field checks in accordance with the manufacturer's recommendations. In addition, include the following:
 - 1. Visual Inspection and Tests:
 - a. Inspect physical and electrical condition.
 - b. Vacuum-clean surface metal raceway interior. Clean metal raceway exterior.
 - c. Test wiring devices for damaged conductors, high circuit resistance, poor connections, inadequate fault current path, defective devices, or similar problems using a portable receptacle tester. Correct circuit conditions, remove malfunctioning units and replace with new, and retest as specified above.
 - d. Test GFCI receptacles.
 - 2. Healthcare Occupancy Tests:
 - a. Test hospital grade receptacles for retention force per NFPA 99.

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**SECTION 26 56 00
EXTERIOR LIGHTING**

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies the furnishing, installation, and connection of exterior fixtures, poles, and supports. The terms "lighting fixtures", "fixture" and "luminaire" are used interchangeably.

1.2 RELATED WORK:

- A. Section 03 30 00, CAST-IN-PLACE CONCRETE.
- B. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements and items that are common to more than one section of Division 26.
- C. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Low voltage power and lighting wiring.
- D. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.
- E. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits, fittings, and boxes for raceway systems.

1.3 QUALITY ASSURANCE:

- A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES), in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS:

- A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
 - 1. Shop Drawings:
 - a. Submit the following information for each type of lighting fixture designated on the LIGHTING FIXTURE SCHEDULE, arranged in order of lighting fixture designation.
 - b. Material and construction details, include information on housing and optics system.
 - c. Physical dimensions and description.
 - d. Wiring schematic and connection diagram.
 - e. Installation details.
 - f. Energy efficiency data.
 - g. Photometric data based on laboratory tests complying with IES Lighting Measurements testing and calculation guides.
 - h. Lamp data including lumen output (initial and mean), color rendition index (CRI), rated life (hours), and color temperature (degrees Kelvin).

- i. Ballast data including ballast type, starting method, ambient temperature, ballast factor, sound rating, system watts, and total harmonic distortion (THD).
 - j. For LED lighting fixtures, submit US DOE LED Lighting Facts label, and IES L70 rated life.
 - k. Submit site plan showing all exterior lighting fixtures with fixture tags consistent with Lighting Fixture Schedule as shown on drawings. Site plan shall show computer generated point-by-point illumination calculations. Include lamp lumen and light loss factors used in calculations.
2. Manuals:
- a. Submit, simultaneously with the shop drawings, complete maintenance and operating manuals, including technical data sheets, wiring diagrams, and information for ordering replacement parts.
 - b. If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.
3. Certifications: Two weeks prior to final inspection, submit the following.
- a. Certification by the Contractor that the exterior lighting systems have been properly installed and tested.

1.5 APPLICABLE PUBLICATIONS:

- A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.
- B. Aluminum Association Inc. (AA):
 - 1. AAH35.1-06 Alloy and Temper Designation Systems for Aluminum
- C. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. 32-LTS-6 Structural Supports for Highway Signs, Luminaires and Traffic Signals
- D. American Concrete Institute (ACI):
 - 1. 318-05 Building Code Requirements for Structural Concrete
- E. American National Standards Institute (ANSI):
 - 1. C81.61-09 Electrical Lamp Bases - Specifications for Bases (Caps) for Electric Lamps
- F. American Society for Testing and Materials (ASTM):
 - 1. A123/A123M-12 Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - 2. A153/A153M-09 Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 - 3. B108-03a-08 Aluminum-Alloy Permanent Mold Castings
 - 4. C1089-13 Spun Cast Prestressed Concrete Poles

G. Federal Aviation Administration (FAA):

1. AC 70/7460-IK-07 Obstruction Lighting and Marking
2. AC 150/5345-43F-06 Obstruction Lighting Equipment

H. Illuminating Engineering Society of North America (IESNA):

1. HB-9-00 Lighting Handbook
2. RP-8-05 Roadway Lighting
3. LM-52-03 Photometric Measurements of Roadway Sign Installations
4. LM-72-10 Directional Positioning of Photometric Data
5. LM-79-08 Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products
6. LM-80-08 Approved Method for Measuring Lumen Maintenance of LED Light Sources
7. TM-15-07 Backlight, Uplight and Glare (BUG) Ratings

I. National Electrical Manufacturers Association (NEMA):

1. C78.41-06 Electric Lamps - Guidelines for Low-Pressure Sodium Lamps
2. C78.42-07 Electric Lamps - Guidelines for High-Pressure Sodium Lamps
3. C78.43-07 Electric Lamps - Single-Ended Metal-Halide Lamps
4. C78.1381-98 Electric Lamps - 70-Watt M85 Double-Ended Metal-Halide Lamps
5. C82.4-02 Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type)
6. C136.3-05 For Roadway and Area Lighting Equipment - Luminaire Attachments
7. C136.17-05 Roadway and Area Lighting Equipment - Enclosed Side-Mounted Luminaires for Horizontal-Burning High-Intensity-Discharge Lamps - Mechanical Interchangeability of Refractors
8. ICS 2-00 (R2005) Controllers, Contactors and Overload Relays Rated 600 Volts
9. ICS 6-93 (R2006) Enclosures

J. National Fire Protection Association (NFPA):

1. 70-11 National Electrical Code (NEC)

K. Underwriters Laboratories, Inc. (UL):

1. 496-08 Lampholders
2. 773-95 Plug-In, Locking Type Photocontrols for Use with Area Lighting
3. 773A-06 Nonindustrial Photoelectric Switches for Lighting Control
4. 1029-94 High-Intensity-Discharge Lamp Ballasts
5. 1598-08 Luminaires
6. 8750-09 Light Emitting Diode (LED) Equipment for Use in Lighting Products

1.6 DELIVERY, STORAGE, AND HANDLING:

- A. Provide manufacturer's standard provisions for protecting pole finishes during transport, storage, and installation. Do not store poles on ground. Store poles so they are at least 305 mm (12 inches) above ground level and growing vegetation. Do not remove factory-applied pole wrappings until just before installing pole.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS:

- A. Luminaires, materials and equipment shall be in accordance with NEC, UL, ANSI, and as shown on the drawings and specified.

2.2 POLES:

A. General:

1. Poles shall be as shown on the drawings, and as specified. Finish shall be as specified on the drawings.
2. The pole and arm assembly shall be designed for wind loading of [161 km/hr (100 mph)]minimum, as required by wind loading conditions at project site, with an additional 30% gust factor and supporting luminaire(s) and accessories such as shields, banner arms, and banners that have the effective projected areas indicated. The effective projected area of the pole shall be applied at the height of the pole base, as shown on the drawings.
3. Poles shall be embedded type designed for use with underground supply conductors. Poles shall have handhole having a minimum clear opening of 65 x 125 mm (2.5 x 5 inches). Handhole covers shall be secured by stainless steel captive screws.
4. Provide a steel-grounding stud opposite handhole openings, designed to prevent electrolysis when used with copper wire.
5. Provide a base cover that matches the pole in material and color to conceal the mounting hardware pole-base welds and anchor bolts.
6. Hardware and Accessories: All necessary hardware and specified accessories shall be the product of the pole manufacturer.
7. Provide manufacturer's standard finish, as scheduled on the drawings.

B. Types:

1. Aluminum: Provide square aluminum poles manufactured of corrosion-resistant AA AAH35.1 aluminum alloys conforming to AASHTO LTS-4. Poles shall be seamless extruded or spun seamless type.

2.3 FOUNDATIONS FOR POLES:

- A. Foundations shall be cast-in-place concrete, having 3000 psi minimum 28-day compressive strength.
- B. Foundations shall support the effective projected area of the specified pole, arm(s), luminaire(s), and accessories, such as shields, banner arms, and banners, under wind conditions previously specified in this section.

- C. Place concrete in spirally-wrapped treated paper forms for round foundations, and construct forms for square foundations.
- D. Rub-finish and round all above-grade concrete edges to approximately 6 mm (0.25-inch) radius.
- E. Anchor bolt assemblies and reinforcing of concrete foundations shall be as shown on the drawings. Anchor bolts shall be in a welded cage or properly positioned by the tie wire to stirrups.
- F. Prior to concrete pour, install electrode per Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

2.4 LUMINAIRES:

- A. Luminaires shall be weatherproof, heavy duty, outdoor types designed for efficient light utilization, adequate dissipation of lamp and ballast heat, and safe cleaning and relamping.
- B. Illumination distribution patterns, BUG ratings and cutoff types as defined by the IESNA shall be as shown on the drawings.
- C. Incorporate ballasts in the luminaire housing, except where otherwise shown on the drawings.
- D. Lenses shall be frame-mounted, heat-resistant, borosilicate glass, with prismatic refractors, unless otherwise shown on the drawings. Attach the frame to the luminaire housing by hinges or chain. Use heat and aging-resistant, resilient gaskets to seal and cushion lenses and refractors in luminaire doors.
- E. Lamp sockets for high intensity discharge (H.I.D) fixture shall have locking-type porcelain enclosures in conformance to the applicable requirements of ANSI C81.61-09 and UL 496-08.
- F. Pre-wire internal components to terminal strips at the factory.
- G. Bracket-mounted luminaires shall have leveling provisions and clamp-type adjustable slip-fitters with locking screws.
- H. Materials shall be rustproof. Latches and fittings shall be non-ferrous metal.
- I. Provide manufacturer's standard finish, as scheduled on the drawings. Where indicated on drawings, match finish process and color of pole or support materials.
- J. Luminaires shall carry factory labels, showing complete, specific lamp and ballast information.

2.5 LAMPS:

- A. Install the proper lamps in every luminaire installed as shown on the drawings.
- B. Lamps shall be general-service, outdoor lighting types.
- C. Metal-Halide Lamps: Comply with NEMA C78.43 or NEMA C78.1381. Lamps shall be pulse start or ceramic type with wattage and correlated color temperature as indicated on fixture schedule.
- D. LED sources shall meet the following requirements:

1. Operating temperature rating shall be between -40 degrees C (-40 degrees F) and 50 degrees C (120 degrees F).
2. Correlated Color Temperature (CCT): 4000K.
3. Color Rendering Index (CRI): ≥ 85 .
4. The manufacturer shall have performed reliability tests on the LEDs luminaires complying with Illuminating Engineering Society (IES) LM79 for photometric performance and LM80 for lumen maintenance and L70 life.

E. Mercury vapor lamps shall not be used.

2.6 LED DRIVERS:

A. LED drivers shall meet the following requirements:

1. Drivers shall have a minimum efficiency of 85%.
2. Starting Temperature: -40 degrees C (-40 degrees F).
3. Input Voltage: 120 to 480 ($\pm 10\%$) volt.
4. Power Supplies: Class I or II output.
5. Surge Protection: The system must survive 250 repetitive strikes of "C Low" (C Low: 6kV/1.2 x 50 μ s, 10kA/8 x 20 μ s) waveforms at 1-minute intervals with less than 10% degradation in clamping voltage. "C Low" waveforms are as defined in IEEE/ASNI C62.41.2-2002, Scenario 1 Location Category C.
6. Power Factor (PF): ≥ 0.90 .
7. Total Harmonic Distortion (THD): $\leq 20\%$.
8. Comply with FCC Title 47 CFR Part 18 Non-consumer RFI/EMI Standards.
9. Drivers shall be reduction of hazardous substances (ROHS)-compliant.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Install lighting in accordance with the NEC, as shown on the drawings, and in accordance with manufacturer's recommendations.
- B. Pole Foundations:
 1. Excavate only as necessary to provide sufficient working clearance for installation of forms and proper use of tamper to the full depth of the excavation. Prevent surface water from flowing into the excavation. Thoroughly compact backfill with compacting arranged to prevent pressure between conductor, jacket, or sheath, and the end of conduit.
 2. Set anchor bolts according to anchor-bolt templates furnished by the pole manufacturer.
 3. Install poles as necessary to provide a permanent vertical position with the bracket arm in proper position for luminaire location.

4. After the poles have been installed, shimmed, and plumbed, grout the spaces between the pole bases and the concrete base with non-shrink concrete grout material. Provide a plastic or copper tube, of not less than 9 mm (0.375-inch) inside diameter through the grout, tight to the top of the concrete base to prevent moisture weeping from the interior of the pole.

C. Install lamps in each luminaire.

D. Adjust luminaires that require field adjustment or aiming.

3.2 GROUNDING:

- A. Ground noncurrent-carrying parts of equipment, including metal poles, luminaires, mounting arms, brackets, and metallic enclosures, as specified in Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS. Where copper grounding conductor is connected to a metal other than copper, provide specially-treated or lined connectors suitable and listed for this purpose.

3.3 ACCEPTANCE CHECKS AND TESTS:

- A. Verify operation after installing luminaires and energizing circuits.

- - - E N D - - -

**SECTION 31 20 11
EARTH MOVING (SHORT FORM)**

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies the requirements for furnishing all equipment, materials, labor and techniques for earthwork including excavation, fill, backfill and site restoration utilizing fertilizer, seed and/or sod.

1.2 DEFINITIONS:

A. Unsuitable Materials:

1. Fills: Topsoil, frozen materials; construction materials and materials subject to decomposition; clods of clay and stones larger than 75 mm (3 inches); organic materials, including silts, which are unstable; and inorganic materials, including silts, too wet to be stable.
2. Existing Subgrade (except footings): Same materials as above paragraph, that are not capable of direct support of slabs, pavement, and similar items, with the possible exception of improvement by compaction, proofrolling, or similar methods of improvement.
3. Existing Subgrade (footings only): Same as Paragraph 1, but no fill or backfill. If materials differ from design requirements, excavate to acceptable strata subject to the COR's approval.

B. Earthwork: Earthwork operations required within the new construction area. It also includes earthwork required for auxiliary structures and buildings and sewer and other trenchwork throughout the job site.

C. Degree of Compaction: Degree of compaction is expressed as a percentage of maximum density obtained by the test procedure presented in AASHTO T99.

D. The term fill means fill or backfill as appropriate.

1.3 RELATED WORK:

A. Materials testing and inspection during construction: Section 01 45 29, TESTING LABORATORY SERVICES.

B. Protection of existing utilities, fire protection services, existing equipment, roads, and pavements: Section 01 00 00, GENERAL REQUIREMENTS.

1.4 CLASSIFICATION OF EXCAVATION:

A. Unclassified Excavation: Removal and disposal of pavements and other man-made obstructions visible on the surface; utilities, and other items including underground structures indicated to be demolished and removed;

together with any type of materials regardless of character of material and obstructions encountered.

B. Classified Excavation: Removal and disposal of all material not defined as rock.

C. Rock Excavation:

1. Solid ledge rock (igneous, metamorphic, and sedimentary rock).
2. Bedded or conglomerate deposits so cemented as to present characteristics of solid rock which cannot be excavated without blasting; or the use of a modern power excavator (shovel, backhoe, or similar power excavators) of no less than 0.75 m³ (1 cubic yard) capacity, properly used, having adequate power and in good running condition.
3. Boulders or other detached stones each having a volume of 0.4 m³ (1/2 cubic yard) or more.

1.5 MEASUREMENT AND PAYMENT FOR ROCK EXCAVATION:

A. Measurement: Cross section and measure the uncovered and separated materials, and compute quantities by the Registered Professional Land Surveyor or Registered Civil Engineer, specified in Section 01 00 00, GENERAL REQUIREMENTS. Do not measure quantities beyond the following limits:

1. 300 mm (12 inches) outside of the perimeter of formed footings.
2. 600 mm (24 inches) outside the face of concrete work for which forms are required, except for footings.
3. 150 mm (6 inches) below the bottom of pipe and not more than the pipe diameter plus 600 mm (24 inches) in width for pipe trenches.
4. The outside dimensions of concrete work for which no forms are required (trenches, conduits, and similar items not requiring forms).

B. Payment for Differing Site Conditions: When rock excavation, as classified, is encountered, the contract price and time will be adjusted in accordance with Articles, DIFFERING SITE CONDITIONS, CHANGES and CHANGES-SUPPLEMENT of the GENERAL CONDITIONS as applicable.

1.6 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Rock Excavation Report:

1. Certification of rock quantities excavated.
2. Excavation method.
3. Labor.

4. Equipment.
 5. Land Surveyor's or Civil Engineer's name and official registration stamp.
 6. Plot plan showing elevations.
- C. Furnish to the COR, soil samples, suitable for laboratory tests, of proposed off site or on site fill material.

1.7 APPLICABLE PUBLICATIONS:

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. American Association of State Highway and Transportation Officials (AASHTO):
- T99-01.....Moisture-Density Relations of Soils Using a 2.5 kg (5.5 lb) Rammer and a 305 mm (12 inch) Drop
- T180-01.....Moisture-Density Relations of Soils Using a 4.54-kg [10 lb] Rammer and a 457 mm (18 inch) Drop
- D1557-02.....Laboratory Compaction Characteristics of Soil Using Modified Effort
- C. Standard Specifications of Ohio State Department of Transportation, Construction and Material Specifications, latest revision.

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Fills: Materials approved from on site and off site sources having a minimum dry density of 1760 kg/m³ (110 pcf), a maximum Plasticity Index of 6, and a maximum Liquid Limit of 30.
- B. Granular Fill:
1. Under concrete slab, crushed stone or gravel graded from 25 mm (1 inch) to 4.75 mm (No. 4).
 2. Bedding for sanitary and storm sewer pipe, crushed stone or gravel graded from 13 mm (1/2 inch) to 4.75 mm (No. 4).
- C. Fertilizer: (5-10-5) delivered to site in unopened containers that clearly display the manufacturer's label, indicating the analysis of the contents.
- D. Seed: Grass mixture comparable to existing turf delivered to site in unopened containers that clearly display the manufacturer's label, indicating the analysis of the contents.

- E. Sod: Comparable species with existing turf. Use State Certified or State Approved sod when available. Deliver sod to site immediately after cutting and in a moist condition. Thickness of cut must be 19 mm to 32 mm (3/4 inch to 1 1/4 inches) excluding top growth. There shall be no broken pads and torn or uneven ends.

PART 3 - EXECUTION

3.1 SITE PREPARATION:

- A. Clearing: Clearing within the limits of earthwork operations as described or designated by the COR. Work includes removal of trees, shrubs, fences, foundations, incidental structures, paving, debris, trash and any other obstructions. Remove materials from the Medical Center.
- B. Grubbing: Remove stumps and roots 75 mm (3 inches) and larger diameter. Undisturbed sound stumps, roots up to 75 mm (3 inches) diameter, and nonperishable solid objects which will be a minimum of 900 mm (3 feet) below subgrade or finished embankment may be left.
- C. Trees and Shrubs: Trees and shrubs, not shown for removal, may be removed from the areas within 4500 mm (15 feet) of new construction and 2250 mm (7'-6") of utility lines if such removal is approved in advance by the COR. Remove materials from the Medical Center Property. Trees and shrubs, shown to be transplanted, shall be dug with a ball of earth and burlapped in accordance with the latest issue of the, "American Standard for Nursery Stock", of the American Association of Nurserymen, Inc. Transplant trees and shrubs to a permanent or temporary position within two hours after digging. Maintain trees and shrubs held in temporary locations by watering as necessary and feeding semi-annually with liquid fertilizer with a minimum analysis of 5 percent nitrogen, 10 percent phosphorus and 5 percent potash. Maintain plants moved to permanent positions as specified for plants in temporary locations until the conclusion of the contract. Box, and otherwise protect from damage, existing trees and shrubs which are not shown to be removed in the construction area. Repair immediately damage to existing trees and shrubs by trimming, cleaning and painting damaged areas, including the roots, in accordance with standard industry horticultural practice for the geographic area and plant species. Building materials shall not be stored closer to trees and shrubs, that are to remain, than the farthest extension of their limbs.

D. Stripping Topsoil: Unless otherwise indicated on the drawings, the limits of earthwork operations shall extend anywhere the existing grade is filled or cut or where construction operations have compacted or otherwise disturbed the existing grade or turf. Strip topsoil as defined herein, or as indicated in the geotechnical report, from within the limits of earthwork operations as specified above unless specifically indicated or specified elsewhere in the specifications or shown on the drawings. Topsoil shall be fertile, friable, natural topsoil of loamy character and characteristic of the locality. Topsoil shall be capable of growing healthy horticultural crops of grasses. Stockpile topsoil and protect as directed by the COR. Eliminate foreign material, such as weeds, roots, stones, subsoil, frozen clods, and similar foreign materials, larger than 0.014 m³ (1/2 cubic foot) in volume, from soil as it is stockpiled. Retain topsoil on the station. Remove foreign materials larger than 50 mm (2 inches) in any dimension from topsoil used in final grading. Topsoil work, such as stripping, stockpiling, and similar topsoil work, shall not, under any circumstances, be carried out when the soil is wet so that the tilth of the soil will be destroyed.

1. Concrete Slabs and Paving: Score deeply or saw cut to insure a neat, straight cut, sections of existing concrete slabs and paving to be removed where excavation or trenching occurs. Extend pavement section to be removed a minimum of 300 mm (12 inches) on each side of widest part of trench excavation and insure final score lines are approximately parallel unless otherwise indicated. Remove material from the Medical Center.

E. Disposal: All materials removed from the property shall be disposed of at a legally approved site, for the specific materials, and all removals shall be in accordance with all applicable Federal, State and local regulations. No burning of materials is permitted onsite.

3.2 EXCAVATION:

A. Shoring, Sheet piling and Bracing: Shore, brace, or slope to it's angle of repose banks of excavations to protect workmen, banks, adjacent paving, structures, and utilities, in compliance with OSHA requirements.

1. Extend shoring and bracing to the bottom of the excavation. Shore excavations that are carried below the elevations of adjacent existing foundations.

B. Excavation Drainage: Operate pumping equipment and/or provide other materials, means and equipment as required, to keep excavations free of

water and subgrades dry, firm, and undisturbed until approval of permanent work has been received from the COR. When subgrade for foundations has been disturbed by water, remove the disturbed material to firm undisturbed material after the water is brought under control. Replace disturbed subgrade in trenches by mechanically tamped sand or gravel. When removed disturbed material is located where it is not possible to install and properly compact disturbed subgrade material with mechanically compacted sand or gravel, the COR should be contacted to consider the use of flowable fill.

C. Trench Earthwork:

1. Utility trenches (except sanitary and storm sewer):
 - a. Excavate to a width as necessary for sheeting and bracing and proper performance of the work.
 - b. Grade bottom of trenches with bell-holes, scooped-out to provide a uniform bearing.
 - c. Support piping on undisturbed earth unless a mechanical support is shown.
 - d. The length of open trench in advance of pipe laying shall not be greater than is authorized by the COR.
2. Sanitary and storm sewer trenches:
 - a. Trench width below a point 150 mm (6 inches) above top of the pipe shall be 600 mm (24 inches) for up to and including 300 mm (12 inches) diameter and four-thirds diameter of pipe plus 200 mm (8 inches) for pipe larger than 300 mm (12 inches). Width of trench above that level shall be as necessary for sheeting and bracing and proper performance of the work.
 - b. The bottom quadrant of the pipe shall be bedded on undisturbed soil or granular fill.
 - 1) Undisturbed: Bell holes shall be no larger than necessary for jointing. Backfill up to a point 300 mm (12 inches) above top of pipe shall be clean earth placed and tamped by hand.
 - 2) Granular Fill: Depth of fill shall be a minimum of 75 mm (3 inches) plus one-sixth of pipe diameter below the pipe of 300 mm (12 inches) above top of pipe. Place and tamp fill material by hand.
 - c. Place and compact as specified the remainder of backfill using acceptable excavated materials. Do not use unsuitable materials.

- d. Use granular fill for bedding where rock or rocky materials are excavated.
- D. Site Earthwork: Excavation shall be accomplished as required by drawings and specifications. Remove subgrade materials, that are determined by the COR as unsuitable, and replace with acceptable material. If there is a question as to whether material is unsuitable or not, the Contractor shall obtain samples of the material, under the direction of the COR, and the materials shall be examined by an independent testing laboratory for soil classification to determine whether it is unsuitable or not. When unsuitable material is encountered and removed, the contract price and time will be adjusted in accordance with Articles, DIFFERING SITE CONDITIONS, CHANGES and CHANGES-SUPPLEMENT of the GENERAL CONDITIONS as applicable. Adjustments to be based on meters (yardage) in cut section only.
- E. Finished elevation of subgrade shall be as follows:
 - 1. Pavement Areas - bottom of the pavement or base course as applicable.
 - 2. Planting and Lawn Areas - 100 mm (6 inches) below the finished grade, unless otherwise specified or indicated on the drawings.

3.3 FILLING AND BACKFILLING:

- A. General: Do not fill or backfill until all debris, unsatisfactory soil materials, obstructions, and deleterious materials have been removed from the excavation. Proof-roll exposed subgrades with a fully loaded dump truck. Use excavated materials or borrow for fill and backfill, as applicable. Do not use unsuitable excavated materials. Do not backfill until foundation walls have been completed above grade and adequately braced, waterproofing or dampproofing applied, and pipes coming in contact with backfill have been installed, and inspected and approved by the COR.
- B. Proof-rolling Existing Subgrade: Proof-roll with a fully loaded dump truck. Make a minimum of one pass in each direction. Remove unstable uncompactable material and replace with granular fill material completed to mix requirements specified.
- C. Placing: Place material in horizontal layers not exceeding 200 mm (8 inches) in loose depth and then compacted. Do not place material on surfaces that are muddy, frozen, or contain frost.
- D. Compaction: Use approved equipment (hand or mechanical) well suited to the type of material being compacted. Do not operate mechanized vibratory compaction equipment within 3000 mm (10 feet) of new or

existing building walls without the prior approval of the COR. Moisten or aerate material as necessary to provide the moisture content that will readily facilitate obtaining the specified compaction with the equipment used. Compact each layer to not less than 95 percent of the maximum density determined in accordance with the following test method AASHTO T99.

3.4 GRADING:

- A. General: Uniformly grade the areas within the limits of this section, including adjacent transition areas. Smooth the finished surface within specified tolerance. Provide uniform levels or slopes between points where elevations are indicated, or between such points and existing finished grades. Provide a smooth transition between abrupt changes in slope.
- B. Cut rough or sloping rock to level beds for foundations. In unfinished areas fill low spots and level off with coarse sand or fine gravel.
- C. Slope backfill outside the building away from the building walls for a minimum distance of 1800 mm (6 feet).
- D. The finished grade shall be 150 mm (6 inches) below bottom line of windows or other building wall openings unless greater depth is shown.
- E. Place crushed stone or gravel fill under concrete slabs on grade tamped and leveled. The thickness of the fill shall be 150 mm (6 inches), unless otherwise indicated.
- F. Finish subgrade in a condition acceptable to the COR at least one day in advance of the paving operations. Maintain finished subgrade in a smooth and compacted condition until the succeeding operation has been accomplished. Scarify, compact, and grade the subgrade prior to further construction when approved compacted subgrade is disturbed by contractor's subsequent operations or adverse weather.
- G. Grading for Paved Areas: Provide final grades for both subgrade and base course to +/- 6 mm (0.25 inches) of indicated grades.

3.5 LAWN AREAS:

- A. General: Harrow and till to a depth of 100 mm (4 inches), new or existing lawn areas to remain, which are disturbed during construction. Establish existing or design grades by dragging or similar operations. Do not carry out lawn areas earthwork out when the soil is wet so that the tilth of the soil will be destroyed. Plant bed must be approved by COR before seeding or sodding operation begins.

- B. Finished Grading: Begin finish grading after rough grading has had sufficient time for settlement. Scarify subgrade surface in lawn areas to a depth of 100 mm (4 inches). Apply topsoil so that after normal compaction, dragging and raking operations (to bring surface to indicated finish grades) there will be a minimum of 100 mm (4 inches) of topsoil over all lawn areas; make smooth, even surface and true grades, which will not allow water to stand at any point. Shape top and bottom of banks to form reverse curves in section; make junctions with undisturbed areas to conform to existing topography. Solid lines within grading limits indicate finished contours. Existing contours, indicated by broken lines are believed approximately correct but are not guaranteed.
- C. Fertilizing: Incorporate fertilizer into the soil to a depth of 100 mm (4 inches) at a rate of 12 kg/100 m² (25 pounds per 1000 square feet).
- D. Seeding: Seed at a rate of 2 kg/100 m² (4 pounds per 1000 square feet) and accomplished only during periods when uniform distribution may be assured. Lightly rake seed into bed immediately after seeding. Roll seeded area immediately with a roller not to exceed 225 kg/m (150 pounds per foot) of roller width.
- E. Sodding: Topsoil shall be firmed by rolling and during periods of high temperature the topsoil shall be watered lightly immediately prior to laying sod. Sod strips shall be tightly butted at the ends and staggered in a running bond fashion. Placement on slopes shall be from the bottom to top of slope with sod strips running across slope. Secure sodded slopes by pegging or other approved methods. Roll sodded area with a roller not to exceed 225 kg/m (150 pounds per foot) of the roller width to improve contact of sod with the soil.
- F. Watering: The COR is responsible for having adequate water available at the site. As sodding is completed in any one section, the entire sodded area shall be thoroughly irrigated by the contractor, to a sufficient depth, that the underside of the new sod pad and soil, immediately below sod, is thoroughly wet. COR will be responsible for sod after installation and acceptance.

3.6 DISPOSAL OF UNSUITABLE AND EXCESS EXCAVATED MATERIAL:

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Medical Center property.

- B. Place excess excavated materials suitable for fill and/or backfill on site where directed.
- C. Remove from site and dispose of any excess excavated materials after all fill and backfill operations have been completed.
- D. Segregate all excavated contaminated soil designated by the COR from all other excavated soils, and stockpile on site on two 0.15 mm (6 mil) polyethylene sheets with a polyethylene cover. A designated area shall be selected for this purpose. Dispose of excavated contaminated material in accordance with State and Local requirements.

3.7 CLEAN-UP:

Upon completion of earthwork operations, clean areas within contract limits, remove tools, and equipment. Provide site clear, clean, free of debris, and suitable for subsequent construction operations. Remove debris, rubbish, and excess material from the Medical Center property.

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SECTION 32 05 23

CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section shall cover site work concrete constructed upon the prepared subgrade and in conformance with the lines, grades, thickness, and cross sections shown. Construction shall include the following:
- B. Curb.
- C. Pedestrian Pavement: Walks and curb ramps.

1.2 RELATED WORK

- A. Laboratory and Field Testing Requirements: Section 01 45 29, TESTING LABORATORY SERVICES.
- B. Subgrade Preparation: Section 31 20 11, EARTH MOVING.
- C. Concrete Materials, Quality, Mixing, Design and Other Requirements: Section 03 30 00, CAST-IN-PLACE-CONCRETE.

1.3 DESIGN REQUIREMENTS

Design all elements with the latest published version of applicable codes.

1.4 WEATHER LIMITATIONS

Placement of concrete shall be as specified under Article 3.8, COLD WEATHER and Article 3.7, HOT WEATHER of Section 03 30 00, CAST-IN-PLACE CONCRETE.

1.5 SUBMITTALS

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:
- B. Manufacturers' Certificates and Data certifying that the following materials conform to the requirements specified.
 - 1. Expansion joint filler
 - 2. Hot poured sealing compound
 - 3. Reinforcement
 - 4. Curing materials
- C. Data and Test Reports: Select subbase material.
 - 1. Job-mix formula.
 - 2. Source, gradation, liquid limit, plasticity index, percentage of wear, and other tests as specified and in referenced publications.

- D. Decorative Concrete Pavements - Submit manufacturer's technical literature and color charts for approval of the following materials:
1. Integral color additives.
 2. Powder antiquing release agents.
 3. Imprinting/Texturing tools.
 4. Curing and sealing compounds.
 5. Joint sealer to match color of concrete additive.
 6. Design Mixes: For each type of integrally colored concrete.
 7. Samples for Initial Selection: Manufacturer's color charts showing full range of colors available for additives, surface treatments and sealants.
 8. Qualification Data: For firms indicated in "Quality Assurance" Article, including list of completed projects.

1.7 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only. Refer to the latest edition of all referenced Standards and codes.
- B. American Association of State Highway and Transportation Officials (AASHTO):
- M31.....Deformed and Plain Billet Steel Bars for
Concrete Reinforcement (ASTM A615/A615M-96A)
- M55M/55M.....Welded Steel Wire Fabric for Concrete
Reinforcement (ASTM A185)
- M147.....Materials for Aggregate and Soil-Aggregate
Subbase, Base and Surface Courses (R 1996)
- M148.....Liquid Membrane-Forming Compounds for Curing
Concrete (ASTM C309A)
- M213.....Preformed Expansion Joint Fillers for Concrete
Paving and Structural Construction
(Non-extruding and Resilient Bituminous Type)
(ASTM D1751)
- T99.....Moisture-Density Relations of Soils Using a 2.5
kg. (5.5 lb) Rammer and a 305 mm (12 in.) Drop
- T180.....Moisture-Density Relations of Soils Using a 4.54
kg (10 lb.) Rammer and a 457 mm (18 in.) Drop
- C. American Society for Testing and Materials (ASTM):
- C94/C94M.....Ready-Mixed Concrete
- C143/C143M.....Slump of Hydraulic Cement Concrete

C309.....Liquid Membrane-Forming Compounds for Curing
Concrete
C494.....Standard Specification for Chemical Admixtures
for Concrete
C979.....Standard Specification for Pigments for
Integrally Colored Concrete

PART 2 - PRODUCTS

2.1 GENERAL

Concrete shall be Type C, air-entrained as specified in Section 03 30 00, CAST-IN-PLACE CONCRETE, with the following exceptions:

| <u>TYPE</u> | <u>MAXIMUM SLUMP*</u> |
|---|-----------------------|
| Curb & Gutter | 75 mm (3") |
| Pedestrian Pavement | 75 mm (3") |
| * For concrete to be vibrated: Slump as determined by ASTM C143. Tolerances as established by ASTM C94. | |

2.2 REINFORCEMENT

- A. The type, amount, and locations of steel reinforcement shall be as shown on the drawings and in the specifications.
- B. Welded wire-fabric shall conform to AASHTO M55.
- C. Dowels shall be plain steel bars conforming to AASHTO M31 or M42. Tie bars shall be deformed steel bars conforming to AASHTO M31 or M42.

2.3 FORMS

- A. Use metal or wood forms that are straight and suitable in cross-section, depth, and strength to resist springing during depositing and consolidating the concrete, for the work involved.
- B. Do not use forms if they vary from a straight line more than 3 mm (1/8 inch) in any 3000 mm (ten foot) long section, in either a horizontal or vertical direction.
- C. Wood forms should be at least 50 mm (2 inches) thick (nominal). Wood forms shall also be free from warp, twist, loose knots, splits, or other defects. Use approved flexible or curved forms for forming radii.

2.4 CONCRETE CURING MATERIALS

- A. Concrete curing materials shall be Liquid Membrane Curing Compound conforming to AASHTO M148 (ASTM C309) and shall be free of paraffin or petroleum.

2.6 EXPANSION JOINT FILLERS

Material shall conform to AASHTO M213.

2.7 DECORATIVE CONCRETE MATERIALS

- A. Decorative concrete products, including color additives, texturing tools, antiquing and release agents, sealants and curing compounds shall be obtained from a single source with a minimum of 10 years of experience in manufacturing those products.
- B. The installer shall possess a minimum of 5 years of experience in the construction of decorative concrete pavements of similar scope and quality.
- C. Obtain each batch of ready-mix concrete with decorative color additive from the same source to the site to maintain a high degree of consistency.
- D. Color admixtures for integrally colored concrete shall be water-reducing admixture, containing no calcium chloride with coloring agents that are lime proof and UV resistant and conform to requirements of ACI 303.1, ASTM C979, ASTM C494 and AASHTO M194.
 - 1. Color additive shall be integrally mixed in the concrete batch at the rate required by the manufacturer to achieve the approved color sample.
 - 2. Color additive shall be in the range of gray, beige or brown tones and selected from the manufacturer's standard color chart during submittal reviews.
- E. Stamping and imprinting texture shall be a seamless embossing skin for use in texturing concrete pavement that provides a surface appearance of fractured slate with no interior joints in the embossing pattern.
- F. Antiquing release agents shall be compatible with stamping tools and concrete admixtures. A minimum of 2 colors shall be applied.
 - 1. Color of release powders shall be in the range of gray, beige and brown tones and selected from the manufacturer's standard color chart during submittal reviews.
- G. Curing compounds shall comply with ASTM C309 for use with integrally colored concrete.
- H. Joint sealant shall match color of concrete additive.

- I. Concrete sealer shall comply with ASTM C309 for use with integrally colored concrete.

PART 3 - EXECUTION

3.1 SUBGRADE PENETRATION

- A. Prepare, construct, and finish the subgrade as specified in Section 31 20 00, EARTH MOVING.
- B. Maintain the subgrade in a smooth, compacted condition, in conformance with the required section and established grade until the succeeding operation has been accomplished.

3.2 SETTING FORMS

- A. Base Support:
 1. Compact the base material under the forms true to grade so that, when set, they will be uniformly supported for their entire length at the grade as shown.
 2. Correct imperfections or variations in the base material grade by cutting or filling and compacting.
- B. Form Setting:
 1. Set forms sufficiently in advance of the placing of the concrete to permit the performance and approval of all operations required with and adjacent to the form lines.
 2. Set forms to true line and grade and use stakes, clamps, spreaders, and braces to hold them rigidly in place so that the forms and joints are free from play or movement in any direction.
 3. Forms shall conform to line and grade with an allowable tolerance of 3 mm (1/8 inch) when checked with a straightedge and shall not deviate from true line by more than 6 mm (1/4 inch) at any point.
 4. Do not remove forms until removal will not result in damaged concrete or at such time to facilitate finishing.
 5. Clean and oil forms each time they are used.
- C. The Contractor's Registered Professional Land Surveyor, specified in Section 00 72 00, GENERAL CONDITIONS, shall establish and control the alignment and the grade elevations of the forms or concrete slipforming machine operations.
 1. Make necessary corrections to forms immediately before placing concrete.

2. When any form has been disturbed or any subgrade or subbase has become unstable, reset and recheck the form before placing concrete.

3.3 EQUIPMENT

- A. The COR shall approve equipment and tools necessary for handling materials and performing all parts of the work prior to commencement of work.
- B. Maintain equipment and tools in satisfactory working condition at all times.

3.4 PLACING REINFORCEMENT

- A. Reinforcement shall be free from dirt, oil, rust, scale or other substances that prevent the bonding of the concrete to the reinforcement.
- B. Before the concrete is placed, the COR shall approve the reinforcement, which shall be accurately and securely fastened in place with suitable supports and ties. The type, amount, and position of the reinforcement shall be as shown.

3.5 PLACING CONCRETE - GENERAL

- A. Obtain approval of the COR before placing concrete.
- B. Remove debris and other foreign material from between the forms before placing concrete. Obtain approval of the COR before placing concrete.
- C. Before the concrete is placed, uniformly moisten the subgrade, base, or subbase appropriately, avoiding puddles of water.
- D. Convey concrete from mixer to final place of deposit by a method which will prevent segregation or loss of ingredients. Deposit concrete so that it requires as little handling as possible.
- E. While being placed, spade or vibrate and compact the concrete with suitable tools to prevent the formation of voids or honeycomb pockets. Vibrate concrete well against forms and along joints. Over-vibration or manipulation causing segregation will not be permitted. Place concrete continuously between joints without bulkheads.
- F. Install a construction joint whenever the placing of concrete is suspended for more than 30 minutes and at the end of each day's work.
- G. Workmen or construction equipment coated with foreign material shall not be permitted to walk or operate in the concrete during placement and finishing operations.

3.6 PLACING CONCRETE FOR CURB AND PEDESTRIAN PAVEMENT

- A. Place concrete in the forms in one layer of such thickness that, when compacted and finished, it will conform to the cross section as shown.

- B. Deposit concrete as near to joints as possible without disturbing them but do not dump onto a joint assembly.
- C. After the concrete has been placed in the forms, use a strike-off guided by the side forms to bring the surface to the proper section to be compacted.
- D. Consolidate the concrete thoroughly by tamping and spading, or with approved mechanical finishing equipment.
- E. Finish the surface to grade with a wood or metal float.
- F. All Concrete pads and pavements shall be constructed with sufficient slope to drain properly.

3.7 CONCRETE FINISHING - GENERAL

- A. The sequence of operations, unless otherwise indicated, shall be as follows:
 - 1. Consolidating, floating, straight-edging, troweling, texturing, and edging of joints.
 - 2. Maintain finishing equipment and tools in a clean and approved condition.

3.8 CONCRETE FINISHING - CURB

- A. Round the edges of the gutter and top of the curb with an edging tool to a radius of 1/4 inch or as otherwise detailed.
- B. Float the surfaces and finish with a smooth wood or metal float until true to grade and section and uniform in textures.
- C. Finish the surfaces, while still wet, with a bristle type brush with longitudinal strokes.
- D. Immediately after removing the front curb form, rub the face of the curb with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed. Brush the surface, while still wet, in the same manner as the gutter and curb top.
- E. Except at grade changes or curves, finished surfaces shall not vary more than 1/8 inch for gutter and 1/4 inch for top and face of curb, when tested with a 10 foot straightedge.
- F. Remove and reconstruct irregularities exceeding the above for the full length between regularly scheduled joints.
- G. Correct any depressions which will not drain.
- H. Visible surfaces and edges of finished curb shall be free of blemishes, form marks, and tool marks, and shall be uniform in color, shape, and appearance.

3.9 CONCRETE FINISHING

A. Walks and Curb Ramps:

1. Finish the surfaces to grade and cross section with a metal float, trowled smooth and finished with a broom moistened with clear water.
2. Brooming shall be applied to standard concrete pavement only in a transverse direction to the line of traffic. See 3.15 Decorative Concrete for finishing of decorative concrete pavement.
3. Finish all slab edges, including those at formed joints, carefully with an edger having a radius as shown on the Drawings.
4. Unless otherwise indicated, edge the transverse joints before brooming. The brooming shall eliminate the flat surface left by the surface face of the edger. Execute the brooming so that the corrugation, thus produced, will be uniform in appearance and not more than 1/16 inch in depth.
5. The completed surface shall be uniform in color and free of surface blemishes, form marks, and tool marks. The finished surface of the pavement shall not vary more than 3/16 inch when tested with a 10 foot straightedge.
6. The thickness of the pavement shall not vary more than 1/4 inch.
7. Remove and reconstruct irregularities exceeding the above for the full length between regularly scheduled joints.

3.10 JOINTS - GENERAL

- A. Place joints, where shown, conforming to the details as shown, and perpendicular to the finished grade of the concrete surface.
- B. Joints shall be straight and continuous from edge to edge of the pavement.

3.11 CONTRACTION JOINTS

- A. Cut joints to depth as shown with a grooving tool or jointer of a radius as shown or by sawing with a blade producing the required width and depth.
- B. Construct joints in curbs by inserting 1/8 inch steel plates conforming to the cross sections of the curb.
- C. Plates shall remain in place until concrete has set sufficiently to hold its shape and shall then be removed.
- D. Finish edges of all joints with an edging tool having the radius as shown.
- E. Score pedestrian pavement with a standard grooving tool or jointer.

3.12 EXPANSION JOINTS

- A. Use a preformed expansion joint filler material of the thickness as shown to form expansion joints.
- B. Material shall extend the full depth of concrete, cut and shaped to the cross section as shown, except that top edges of joint filler shall be below the finished concrete surface where shown to allow for sealing.
- C. Anchor with approved devices to prevent displacing during placing and finishing operations.
- D. Round the edges of joints with an edging tool.
- E. Form expansion joints as follows:
 - 1. Without dowels, about structures and features that project through, into, or against any site work concrete construction.
 - 2. Using joint filler of the type, thickness, and width as shown.
 - 3. Installed in such a manner as to form a complete, uniform separation between the structure and the site work concrete item.

3.13 FORM REMOVAL

- A. Forms shall remain in place at least 12 hours after the concrete has been placed. Remove forms without injuring the concrete.
- B. Do not use bars or heavy tools against the concrete in removing the forms. Promptly repair any concrete found defective after form removal.

3.14 CURING OF CONCRETE

- A. Cure concrete appropriate to the weather conditions and local construction practices, against loss of moisture, and rapid temperature changes for at least seven days from the beginning of the curing operation. Protect unhardened concrete from rain and flowing water. All equipment needed for adequate curing and protection of the concrete shall be on hand and ready to install before actual concrete placement begins. Provide protection as necessary to prevent cracking of the pavement due to temperature changes during the curing period. If any selected method of curing does not afford the proper curing and protection against concrete cracking, remove and replace the damaged pavement and employ another method of curing as directed by the COR.
- B. Liquid Membrane Curing:
 - 1. Apply pigmented membrane-forming curing compound in two coats at right angles to each other at a rate of 200 square feet per gallon for both coats.
 - 2. Do not allow the concrete to dry before the application of the membrane.

3. Cure joints designated to be sealed by inserting moistened paper or fiber rope or covering with waterproof paper prior to application of the curing compound, in a manner to prevent the curing compound entering the joint.
4. Immediately re-spray any area covered with curing compound and damaged during the curing period.

3.15 DECORATIVE CONCRETE PAVEMENT

- A. Schedule delivery of concrete to provide consistent mix times from batching until discharge. Mix times shall meet manufacturer's written recommendations.
- B. Prior to installation of decorative concrete pavement, install a 8'x8'x4"-thick mock-up panel at a location on the site that is designated by the COR for review and approval.
 1. The mock-up panel shall be constructed using all specified materials and imprinting techniques of the final decorative concrete pavement system.
 2. Remove the mock-up panel after installation of final decorative concrete pavement, or as otherwise directed by the COR. Repair damaged site areas, disturbed from mock-up procedures, to their original conditions.
- B. Finishing of decorative concrete pavement shall be completed as follows:
 1. After initial floating, troweling and edging procedures and while concrete surface, cast antiquing and release powders onto pavement surface using manufacturer's specified procedures, techniques and rates of distribution.
 2. Immediately follow powder applications with imprinting of surface texture using manufacturer's procedures and techniques.

3.16 CLEANING

- A. After completion of the curing period:
 1. Sweep the concrete clean.
 2. After removal of all foreign matter from the joints, seal joints as herein specified.
 3. Clean the entire concrete of all debris and construction equipment as soon as curing and sealing of joints has been completed.

3.17 PROTECTION

The contractor shall protect the concrete against all damage prior to final acceptance by the Government. Remove concrete containing excessive cracking, fractures, spalling, or other defects and reconstruct the

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VAMC WADE PARK
SMOKE SHELTER
PROJECT#: 541-17-212

entire section between regularly scheduled joints, when directed by the COR, and at no additional cost to the Government. Exclude traffic from vehicular pavement until the concrete is at least seven days old, or for a longer period of time if so directed by the COR.

3.18 FINAL CLEAN-UP

Remove all debris, rubbish and excess material from the Station.

- - - E N D - - -

**SECTION 32 84 00
PLANTING IRRIGATION**

PART 1 - GENERAL**1.1 DESCRIPTION**

Modifications to an existing automatically-controlled irrigation system, complete, including piping, sprinkler heads, valves, controls, control wiring, fittings, electrical connections and necessary accessories.

1.2 RELATED WORK

- A. Concrete: Section 03 30 00, CAST-IN-PLACE CONCRETE.
- B. Maintenance of Existing Utilities: Section 01 00 00, GENERAL REQUIREMENTS.
- C. Excavation, Trench Widths, Pipe Bedding, Backfill, Shoring, Sheeting, Bracing: Section 31 20 11, EARTH MOVING.
- D. Division 26, ELECTRICAL.
- E. Section 32 90 00, PLANTING

1.3 QUALITY ASSURANCE

- A. Criteria:
 - 1. Manufacturer regularly and presently manufactures the item submitted as one of their principal products.
 - 2. There is a permanent service organization, maintained or trained by the manufacturer, which will render satisfactory service within eight hours of receipt of notification that service is requested.
 - 3. Installer, or supplier of a service, has technical qualifications, experience, and trained personnel and facilities to perform the specified work.
- B. Products Criteria:
 - 1. Multiple Units: When two or more units of the same type or class of materials or equipment are required, these units are products of one manufacturer.
 - 2. Assembled Units: Manufacturers of equipment assemblies, which use components made by others, assume complete responsibility for the final assembled product.
 - a. All components of an assembled unit need not be products of the same manufacturer but component parts which are alike are the product of a single manufacturer.
 - b. Components are compatible with each other and with the total assembly for the intended service.

3. Nameplates: Nameplate bearing manufacturer's name or identification trademark securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped, or otherwise permanently marked on each item of equipment.

C. System Requirements:

1. Full and complete coverage is required. Contractor shall, at no additional cost to the Government, make necessary adjustments to layout required to achieve full coverage of irrigated areas without overthrow on roadways, sidewalks, or buildings and to protect trees from close high spray velocity.
2. Layout work as closely as possible to drawings. Drawings are diagrammatic to the extent that swing joints, offsets and all fittings are not shown. Lines are to be common trenched wherever possible.
3. Locations of control valves is schematic. Control valves shall be grouped wherever possible and aligned at a set dimension back of curb along roads.
4. Connect new system to existing mains.
5. Prior to start of site demolition and clearing, evaluate existing irrigation system within area to be disturbed and provide recommendations to COE for temporary abandoning.
6. Disconnect and abandon existing irrigation system in areas of site where improvements are shown on Drawings.
7. Restore any damages to existing irrigation system from activities of proposed site improvements as directed by COE.

D. Maintenance and Operating Instructions: Prior to final acceptance, verbal instructions, for a period of not less than 8 hours, shall be provided to the operating personnel. Provide manuals as specified in Section 01 00 00, GENERAL REQUIREMENTS.

E. Completely program controller and satellites according to approved irrigation schedule.

F. Follow manufacturer's instructions for installation.

G. Manufacturer of Control Systems to certify Control System is complete, including all related components, and totally operational. Submit certificate to COE.

H. As-Built Record Drawings: Maintain a complete set of as-built drawings which shall be corrected daily to show changes in locations of all pipe, valves, pumps and related irrigation equipment. Valves shall be shown

with dimensions to reference points.

I. Controller Chart:

1. Prepare a map diagram showing location of all valves, lateral lines, and route of the control wires. Identify all valves as to size, station, number and type of irrigation. "As-built" drawings must be approved before charts are prepared. Where an existing controller chart is present, provide modifications to reflect system changes.
2. Provide one controller chart showing the area covered by controller for each automatic controller supplied at the maximum size controller door will allow. Chart shall be a reduced drawing of the actual "as-built" system. If controller sequence is not legible when the drawing is reduced to door size, the drawing shall be enlarged to a size that is readable and placed folded, in a sealed plastic container, inside the controller door. Where an existing controller chart is present, provide modifications to reflect system changes.
3. Chart shall be a blackline print with a different color used to show area of coverage for each station. Charts must be completed and approved prior to final inspection of the irrigation system.

1.4 SUBMITTALS

- A. Submit as one package in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturers' Literature and Data:
 1. Piping.
 2. Jointing materials.
 3. Valves.
 4. Automatic control equipment.
 5. Sprinkler heads.
 6. Quick couplers.
 7. Valve boxes.
- C. Reproducible "as-built" drawings.
- D. After "as-built" drawings have been approved, submit print of controller chart.

1.5 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):
D1785-04a.....Poly(Vinyl Chloride) (PVC) Plastic Pipe,

Schedule 40, 80, and 120

D2241-04b.....Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe
(SDR Series)

D2287-96(2001).....Nonrigid Vinyl Chloride Polymer and Copolymer
Molding and Extrusion Compounds

D2464-99e1.....Threaded Poly (Vinyl Chloride) (PVC) Plastic
Pipe Fittings, Schedule 80

D2466-05.....Poly(Vinyl Chloride) (PVC) Plastic Pipe
Fittings, Schedule 40

D2564-04.....Solvent Cements for Poly (Vinyl Chloride) (PVC)
Plastic Piping Systems

D2855-96(2002).....Making Solvent Cemented Joints with Poly(Vinyl
Chloride) (PVC) Pipe and Fittings

F477-02e1.....Elastomeric Seals (Gaskets) for Joining Plastic
Pipe

C. Manufacturers Standardization Society (MSS):

SP70-1998.....Cast Iron gate Valves, Flanged and Thread Ends

PART 2 - PRODUCTS

2.1 PIPING

A. Irrigation Mains: Provide one of the following materials.

1. Polyvinyl Chloride (PVC) Pressure Pipe, AWWA C900, PVC 1120, working
pressure 1025 kPa (150 psi).

B. Irrigation Laterals: Polyvinyl Chloride, ASTM D2241, PVC 1120, SDR 21,
solvent welded.

C. Threaded Pipe: Polyvinyl Chloride, ASTM D1785, PVC 1120, Schedule 80,
for threaded connections, risers and swing joints.

D. Fittings:

1. Irrigation Laterals: PVC, schedule 40, solvent welded socket type,
ASTM D2466.

2. Threaded Pipe: PVC, schedule 80, ASTM D2464.

3. Swing Joints: Threaded fittings with elastomeric seals that allow 360
degree rotation, and designed for minimum 1375 kPa (200 psig) working
pressure, may be used in lieu of standard threaded fittings.

F. Jointing Materials:

1. Irrigation Mains and Laterals: Solvent cement, ASTM D2564.

2.2 VALVES (EXCEPT CONTROL VALVES)**A. Underground Shut-Off Valves: Provide One of the Following:**

1. Ball valves (for isolation valves 1-1/2" and smaller): Full-port ball valves with bronze body, PTFE seats, and 90 degree on/off handle. Ball valves to have NPT female end connections.

B. Operations:

1. Underground: furnish valves with 50 mm (2 inch) nut for T-Handle socket wrench operation.
2. Ends of valves shall accommodate the type of pipe installed.

C. Check: Swing.

1. Smaller than 100 mm (4 inches): Bronze body and bonnet, ASTM B61 or B62, 850 kPa (125 pound) WSP.

2.3 VALVE BOX**A. When in pavement, valve boxes shall be precast concrete (from Rigid Cast Iron Forms) with compressive strength of the concrete in excess of 30 MPa (4000 psi). In planter areas, valve boxes shall be HDPE structural foam Type A, Class III, green in color. Box shall be minimum 475 mm (19 inches) long by 350 mm (14 inches) deep with key-lockable cover.**

1. After installation, label boxes with two 80 mm (3 inch) size stencils designated controller and circuit numbers with permanent white epoxy paint. Numbers shall be placed at center of valve cover and shall face nearest main road or service road.
2. Furnish two (2) 750 mm (30 inch) long valve adjustment keys.

2.4 EXISTING AUTOMATIC CONTROL EQUIPMENT-INDEPENDENT ELECTRIC CONTROLLERS**A. The existing electric automatic control system shall be used to operate individual remote control valves in accordance with timing schedules programmed into the independent units.****2.5 CONTROL VALVES:****A. Each sprinkler section shall be automatically operated by a remote control valve installed underground and operated by a 24-volt AC electric solenoid. Valves shall be globe type of heavy duty construction and shall have manual shut-off and flow control adjustment and provide for manual operation. Install valves with unions on each side to allow for easy removal. Valves shall have a minimum of 1025 kPa (150 psi) working pressure.****B. Valves shall be diaphragm type designed to operate in water containing sand and debris and shall have a self cleaning type contamination filter**

to filter all water leading to the solenoid actuator and the diaphragm chamber. Valve shall incorporate a non-adjustable type opening and closing speed control for protection against surge pressures, or valves shall operate by means of a slow acting direct drive thermal hydraulic motor without ports, screens or diaphragms.

- C. Valves shall be completely serviceable from the top without removing valve body from the system. Furnish two (2) 750 mm (30 inch) long adjustment keys. Valves to operate at no more than 50 kPa (7 psi) pressure loss at manufacturers maximum recommended flow rate.

2.6 SPRINKLER HEADS

- A. Shall be of make, type and performance as indicated on drawings. The entire internal assembly including filter screen, to be capable of removal from the top without removing the sprinkler case from the riser.
- B. Rotary Pop-up Sprinklers: To be gear-driven.
 - 1. Full Circle Sprinklers: To be a dual or tri-nozzle combination type with positive drive by means of a water-driven gear assembly. Sprinkler head to rotate uniformly and to be driven by means of a train of gears. Sprinklers to be equipped with an integral anti-drain valve to be self-closing at pressures of 3.0m (10 feet) of head or less. Gears and pinions shall be assembled on stainless steel spindles in a water-lubricated sandproof gear case. An inlet screen shall prevent debris from entering the sprinkler and shall be removable with the internal assembly. Sprinklers outer case shall be constructed of corrosion resistant, impact resistant, heavy-duty ABS.
 - 2. Part circle sprinklers to be variable arc type as required with same type drive used for full circle heads.
- C. Shrub Spray Heads: Nozzle shall be pop-up or fixed spray type of standard, undersize or oversize configuration as noted on plans. The sprinkler body, stem, nozzle and screen shall be constructed of heavy-duty, ultraviolet resistant plastic. It shall have a heavy duty stainless steel retract spring and a ratcheting system for alignment of the pattern. The sprinkler shall have a soft elastomer pressure-activated comolded wiper seal for cleaning debris from the pop-up stem. The sprinkler shall have a plastic or brass nozzle with an adjusting screw capable of regulating the radius and flow. The sprinkler shall be capable of housing protective, nonclogging filter screens or pressure compensating screens (PCS) under the nozzle.

2.7 QUICK COUPLERS

- A. Shall have all parts contained in a two-piece unit and shall consist of a coupler water seal valve assembly and a removable upper body to allow the spring and key track to be serviced without shut down of the main.
- B. Metal parts shall be brass.
- C. Lids shall be lockable vinyl covered and have springs for positive closure on key removal.
- D. Furnish two(2) hose swivels and operating keys for each size coupler to the COE.

2.8 LOW VOLTAGE CONTROL VALVE WIRE

Wire: Solid copper wire, Underwriters Laboratories Inc. approved for direct burial in ground. Size of wire shall be in accordance with manufacturer's recommendations, but in no case less than No. 14.

2.9 SPLICING MATERIALS: EPOXY WATERPROOF SEALING PACKET. LOW VOLTAGE CONTROLLER CABLE

Multi-strand cable, Underwriters Laboratories Inc. approved for direct burial in ground. Size and type of wire shall be in accordance with manufacturer's recommendations.

2.10 SLEEVE MATERIAL

PVC-1120-5DR 17, Schedule 40.

2.11 WARNING TAPE

Standard, 4-Mil polyethylene 76 mm (3 inch) wide tape, detectable type blue with black letters and imprinted with "CAUTION BURIED IRRIGATION WATER LINE BELOW.

PART 3 - EXECUTION**3.1 PIPE LAYING - GENERAL**

- A. Do not lay pipe on unstable material, in wet trench or when, in the opinion of COE, trench or weather conditions are unsuitable for the work.
- B. Concrete thrust block shall be installed where the irrigation main changes direction as at ells and tees and where the irrigation main terminates. Pressure tests shall not be made for a period of 36 hours following the completion of pouring of the thrust blocks. Concrete thrust blocks for supply mains shall be sized and placed in strict accordance with the pipe manufacturer's specifications and shall be of an adequate size and so placed as to take all thrust created by the maximum internal water pressure.

- C. Allow a minimum of 80 mm (3 inches) between parallel pipes in the same trench.
- D. Hold pipe securely in place while joint is being made.
- E. Do not work over, or walk on, pipe in trenches until covered by layers of earth well tamped in place to a depth of 300 mm (12 inches) over pipe.
- F. Full length of each section of pipe shall rest upon the pipe bed with recesses excavated to accommodate bells or joints. Do not lay pipe on wood blocking.
- G. Install sprinkler lines to avoid heating trenches, electric ducts, storm and sanitary sewer lines, and existing water and gas mains, all of which have right of way.
- H. Clean interior of pipe of foreign matter before installation. Keep pipe clean during laying operations by means of plugs or other methods. When work is not in progress, securely close open ends of pipe and fittings to prevent water, earth, or other substances from entering.
- I. Each sprinkler section shall drain to waste valves placed at lowest points in the system. Waste valves shall discharge to drainage pits composed of 3 foot long vertical sections of 600 mm (24 inch) diameter sewer pipe placed under the lawn areas. Fill pipe with gravel and cover with 50 mm (2 inch) precast concrete cover before backfilling. Waste valves may also discharge to storm sewers, where available.
- J. Minimum cover over water mains shall be 750 mm (30 inches). Control valves shall never be less than 80 mm (3 inches) below finished grade. Cover laterals to minimum depth of 600mm (24 inches).
- K. Existing sidewalks and curbs shall not be cut during trenching and installation of pipe. Install pipe under sidewalks and curbs by jacking, auger boring, or by tunneling. Repair or replace any concrete that cracks, due to settling, during the warranty period.
- L. Close pipe openings with caps or plugs during installation. Tightly cover and protect fixtures and equipment against dirt, water and chemical or mechanical injury. At completion of all work thoroughly clean fixtures, exposed materials and equipment.
- M. Warning tape shall be continuously placed 300 mm (12 inches) above sprinkler system water mains and laterals.

3.2 LAYING PLASTIC PIPE

- A. Shall be snaked in trench at least 1 meter to 100 meters (1 foot per 100 feet) to allow for thermal construction and expansion and to reduce

strain on connections.

B. Joints

1. Solvent Welded Socket Type: ASTM D2855.
2. Threaded Type: Apply liquid teflon thread lubricant of teflon thread type. After joint is made hand tight (hard), a strap wrench should be used to make up to two additional full turns.
3. Elastomeric Gasket: ASTM F477.
 - a. Immediately before joining two lengths of PVC pipe, the inside of the bell or coupling, the outside of the spigot and the elastomeric gasket shall be thoroughly cleaned to remove all foreign material.
 - b. Lubrication of the joint and rubber gasket shall be done in accordance with the pipe manufacturer's specifications.
 - c. Care shall be taken that only the correct elastomeric gasket, compatible with the annular groove of the bell, is used. Insertion of the elastomeric gasket in the annular groove of the bell or coupling shall be in accordance with the manufacturer's recommendations. Pipe that is not furnished with a depth mark shall be marked before assembly to assure that the spigot end is inserted to the full depth of the joint.
 - d. The spigot and bell or coupling shall be aligned and pushed until the reference line on the spigot is flush with the end of the bell or coupling. Pushing shall be done in a smooth, steady motion.

3.3 INSTALLATION OF SPRINKLERS AND QUICK COUPLERS

- A. Sprinkler heads and quick couplers shall be placed on temporary nipples extending at least 80 mm (3 inches) above finished grade. After turf is established, remove temporary nipples, ensuring that no dirt or foreign matter enters outlet, and install sprinkler heads and quick couplers at ground surface as detailed.
- B. Place part-circle rotary sprinkler heads no more than 150 mm (6 inches) from edge, of and flush with top of adjacent walks, header boards, curbs, and mowing aprons, or paved areas at time of installation.
- C. Install all shrub sprays, sprinklers and quick couplers on swing joints as detailed on plans.
- D. Set shrub heads 200 mm (8 inches) above grade and 300 mm (1 foot) from edge of curb or pavement. Place adjacent to walls. Stake heads prior to backfilling trenches. Stakes to be parallel to riser.
- E. Install sprinklers and quick coupling valves on a swing joint assembly.

3.4 INSTALLATION OF CONTROL WIRING

- A. Wiring from master controllers to satellites and stub-cuts for future extension shall be located in trench with new mains or in separate trench at back of curb, unless cross-country route is shown. Locate in trench with mains when possible on cross-country routes.
- B. Wiring bundles located with piping shall be set with top of the bundle below top of the pipe. No two wires in any bundle shall be of the same color. Wires shall be bundled, and tied or taped at 4.5 m (15 foot) intervals. A numbered tag shall be provided at each end of a wire, i.e., at valve, at field located controllers and at master controller. The number at each end of wire to be the same.
- C. Splicing shall be held to a minimum. A pullbox shall be provided at each splice. No splices will be allowed between field located controllers and remote control valves.
- D. Provide 300 mm (12 inch) expansion loops in wiring at each wire connection or change in wire direction. Provide 600 mm (24 inch) loop at remote control valves.
- E. Power wiring for the operation of irrigation system shall not be run in same conduit as control wiring.

3.5 SETTING OF VALVES

- A. No valves shall be set under roads, pavement or walks.
- B. Clean interior of valves of foreign matter before installation.
- C. Where pressure control valves are installed adjacent to remote control valve, they shall be housed in the same valve box.
- D. Set valve box cover flush with finished grade.

3.6 SLEEVING

- A. Furnish and install where pipe and control wires pass under walks, paving, walls, and other similar areas.
- B. Sleeving to be twice line size or greater to accommodate retrieval for repair of wiring or piping and shall extend 300 mm (12 inches) beyond edges of paving or construction.
- C. Bed sleeves with a minimum of 100 mm (4 inches) of sand backfill above top of pipe.

3.7 TEST AND FLUSHING

- A. Pressure Test: Pressure test lines before joint areas are backfilled. Backfill a minimum of 300 mm (12 inches) over the pipe to maintain pipe stability during test period. Test piping at hydraulic pressure of 1025 kPa (150 psi) for two hours. Maximum loss shall be 3 L/25 mm pipe

diameter/300 m (0.8 gallons/inch pipe diameter/1000-feet). Locate pump at low point in line and apply pressure gradually. Install pressure gage shut-off valve and safety blow-off valve between pressure source and piping. Inspect each joint and repair leaks. Line shall be retested until satisfactory.

- B. Flushing: After testing, flush system with a minimum of 150 percent of operating flow passing through each pipe beginning with larger mains and continuing through smaller mains in sequence. Flush lines before installing sprinkler heads and quick couplers.
- C. Operation Test: Upon completion of the final adjustment of the sprinkler heads to permanent level at ground surface, test each sprinkler section by the pan test and visual test to indicate a uniform distribution within any one sprinkler head area and over the entire area. Operate the entire installation to demonstrate to the COE the complete and successful operation of all equipment and full coverage of landscape areas by the system.

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**SECTION 32 90 00
PLANTING**

PART 1 - GENERAL

1.1 DESCRIPTION

This work consists of furnishing and installing all planting materials required for landscaping hereinafter specified in locations as shown.

1.2 EQUIPMENT

Maintain all equipment, tools and machinery while on the project in sufficient quantities and capacity for proper execution of the work.

1.3 RELATED WORK

- A. Section 31 20 11, EARTH MOVING, Stripping Topsoil and Stock Piling.
- B. Section 31 20 11, EARTH MOVING, Topsoil Materials.
- C. Section 32 84 00, PLANTING IRRIGATION.
- D. Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.

1.4 SUBMITTALS

- A. Samples: Submit the following samples for approval before work is started:

| | |
|---------------|--|
| Inert Mulch | 2.3 kg (5 pounds) of each type to be used. |
| Organic Mulch | 2.3 kg (5 pounds) of each type to be used. |

- B. Certificates of Conformance or Compliance: Before delivery, notarized certificates attesting that the following materials meet the requirements specified shall be submitted to the COE for approval:
 - 1. Plant Materials (Department of Agriculture certification by State Nursery Inspector declaring material to be free from insects and disease).
 - 2. Fertilizers.
 - 3. Peat
 - 4. Seed
 - 5. Sod
 - 6. Membranes
- C. Manufacturer's Literature and Data:
 - 1. Metal edging
 - 2. Antidesiccant
 - 3. Pre-emergent herbicide

E. Soil laboratory testing results and any soil amendment recommendations from the Contractor.

1.5 DELIVERY AND STORAGE

A. Delivery:

1. Notify the COE of the delivery schedule in advance so the plant material may be inspected upon arrival at the job site. Remove unacceptable plant material from the job site immediately.
2. Protect plants during delivery to prevent damage to root balls or desiccation of leaves. Protect trees during transport by tying in the branches and covering all exposed branches.
3. The use of equipment such as "tree spades" is permitted provided the plant balls are sized in accordance with ANSI Z60.1 and tops are protected from damage.
4. Deliver fertilizer and lime to the site in the original, unopened containers bearing the manufacturer's warranted chemical analysis, name, trade name or trademark, and in conformance to state and federal law.
5. During delivery: Protect sod, from drying out and seed from contamination.

B. Storage:

1. Sprinkle sod with water and cover with moist burlap, straw or other approved covering, and protect from exposure to wind and direct sunlight. Covering should permit air circulation to alleviate heat development.
2. Keep seed, lime, and fertilizer in dry storage away from contaminants.
3. Store plants not installed on the day of arrival at the site as follows:
 - a. Shade and protect plants from the wind when stored outside.
 - b. Heel in bare root plants.
 - c. Protect plants stored on the project from drying out at all times by covering the balls or roots with moist sawdust, wood chips, shredded bark, peat moss, or other similar mulching material.
 - d. Keep plants, including those in containers, in a moist condition until planted, by watering with fine mist spray.

1.6 PLANTING AND TURF INSTALLATION SEASONS AND CONDITIONS

- A. Perform operations within the following dates: From March 30 to June 15 for spring and from August 15 to October 15 for fall, but not before irrigation system installed, tested, and approved by the COE.
- B. No work shall be done when the ground is frozen, snow covered, too wet or in an otherwise unsuitable condition for planting. Special conditions may exist that warrants a variance in the specified planting dates or conditions. Submit a written request to the COE stating the special conditions and proposal variance.

1.7 PLANT AND TURF ESTABLISHMENT PERIOD

- A. The Establishment Period for plants and turf shall begin immediately after installation, with the approval of the COE, and continue until the date that the Government accepts the project or phase for beneficial use and occupancy. During the Plant and Turf Establishment Period the Contractor shall:
 - 1. Water all plants and turf to maintain an adequate supply of moisture within the root zone. An adequate supply of moisture is the equivalent of 25 mm (1 inch) of absorbed water per week either through natural rainfall or augmented by periodic watering. Apply water at a moderate rate so as not to displace the mulch or flood the plants and turf.
 - 2. Prune plants and replace mulch as required.
 - 3. Replace and restore stakes, guy wires, and eroded plant saucers as required.
 - 4. In plant beds and saucers, remove grass, weeds, and other undesired vegetation, including the root growth, before they reach a height of 75 mm (3 inches).
 - 5. Spray with approved insecticides and fungicides to control pests and ensure plant survival in a healthy growing condition, as directed by the COE.
 - 6. Provide the following turf establishment:
 - a. Eradicate all weeds. Water, fertilize, overseed, and perform any other operation necessary to promote the growth of grass.
 - b. Replant areas void of turf 0.1 m² (one square foot) and larger in area.
 - c. Mow the new lawn at least three times prior to the final inspection. Begin mowing when grass is 100 mm (4 inches) high. Mow to a 65 mm (2-1/2 inch) height.

7. Remove plants that die during this period and replace each plant with one of the same size and species.

1.8 PLANT AND TURF WARRANTY

- A. All work shall be subject to the terms of the "Warranty of Construction" Article in FAR clause 52.246-21, including the following supplements:
- B. A One Year Plant and Turf Warranty will begin on the date that the Government accepts the project or phase for beneficial use and occupancy. The Contractor shall have completed, located, and installed all plants and turf according to the plans and specifications. All plants and turf are expected to be living and in a healthy condition at the time of final inspection.
- C. The Contractor will replace any dead plant material and any areas void of turf immediately. A one year warranty for the plants and turf that was replaced, will begin on the day the work is completed.
- D. Replacement of relocated plants, that the Contractor did not supply, is not required unless they die from improper handling and care during transplanting. Loss through Contractor negligence requires replacement in kind and size.
- E. The Government will reinspect all plants and turf at the end of the One Year Warranty. The Contractor will replace any dead, missing, or defective plant material and turf immediately. The Warranty will end on the date of this inspection provided the Contractor has complied with the work required by this specification. The Contractor shall also comply with the following requirements:
 1. Replace dead, missing or defective plant material prior to final inspection.
 2. Mulch and weed plant beds and saucers. Just prior to this inspection, treat these areas to a second application of approved pre-emergent herbicide.
 3. From plants having been installed for one year, remove stakes, guy wires and any required tree wrappings.
 4. Complete remedial measures directed by the COE to ensure plant and turf survival.
 5. Repair damage caused while making plant or turf replacements.

1.9 APPLICABLE PUBLICATIONS

- A. The publications listed below, form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation only.

- B. American National Standards Institute (ANSI) Publications:
 - ANSI Z60.1-1996.....Nursery Stock
 - ANSI Z133.1-2000.....Tree Care Operations-Pruning, Trimming,
Repairing, Maintaining, and Removing Trees and
Cutting Brush- Safety Requirements
- C. Hortus Third, A Concise Dictionary of Plants Cultivated in the U.S. and
Canada, Wiley Publishers, 1976.
- D. American Society For Testing And Materials (ASTM) Publications:
 - C136-05(Rev. A).....Sieve Analysis of Fine and Coarse Aggregates
- E. Turf Producers International:
 - Guideline Specifications to Turfgrass Sodding 1995 ed.
- F. U. S. Department of Agriculture Federal Seed Act of August 9, 1939:
 - 53 Stat. 1275.....Rules and Regulations

PART 2 - PRODUCTS

2.1 GENERAL

All plant and turf material will conform to the varieties specified or shown in the plant list and be true to botanical name as listed in Hortus Third.

2.2 PLANTS

- A. Plants shall be in accordance with ANSI Z60.1, except as otherwise stated in the specifications or shown on the plans. Where the drawings or specifications are in conflict with ANSI Z60.1, the drawings and specification shall prevail.
- B. Provide well-branched and formed planting stock, sound, vigorous, and free from disease, sunscald, windburn, abrasion, harmful insects or insect eggs with healthy, normal, and unbroken root systems. Provide trees, deciduous and evergreen, that are single trunked with a single leader, unless otherwise indicated, display no weak crotches. Provide symmetrically developed deciduous trees and shrubs of uniform habit of growth, with straight boles or stems and free from objectionable disfigurements, and evergreen trees and shrubs with well developed symmetrical tops with typical spread of branches for each particular species or variety. Provide ground cover and vine plants with the number and length of runners for the size specified, and the proper age for the grade of plants specified. Provide vines and ground cover plants well established in removable containers, integral containers, or formed homogeneous soil sections. Plants shall have been grown under climatic

conditions similar to those in the locality of the project. Spray all plants budding into leaf or having soft growth with an anti-desiccant at the nursery before digging.

- C. The minimum acceptable sizes of all plants, measured before pruning with branches in normal position, shall conform to the measurements designated. Plants larger in size than specified may be used with the approval of the COE, with no change in the contract price. When larger plants are used, increase the ball of earth or spread of roots in accordance with ANSI Z60.1.
- D. Provide nursery grown plant material conforming to the requirements and recommendations of ANSI Z60.1. Dig and prepare plants for shipment in a manner that will not cause damage to branches, shape, and future development after planting.
- E. Balled and burlapped (B&B) plant ball sizes and ratios will conform to ANSI Z60.1, consisting of firm, natural balls of soil wrapped firmly with burlap or strong cloth and tied.
- F. Bare-root (BR) plants shall have the root system substantially intact, but with the earth carefully removed. Cover roots with a thick coating of mud by "puddling" after the plants are dug.
- G. Container grown plants shall have sufficient root growth to hold the earth intact when removed from containers, but shall not be root bound.
- H. Make substitutions only when a plant (or its alternates as specified) is not obtainable and the COE authorizes a change order providing for use of the nearest equivalent obtainable size or variety of plant having the same essential characteristics with an equitable adjustment of the contract price.
- I. When existing plants are to be relocated, ball sizes shall conform to requirements for collected plants in ANSI Z60.1, and plants shall be dug, handled, and replanted in accordance with applicable sections of these specifications.

2.3 LABELS

Each plant, or group and bundles or containers of the same species, variety, and size of plant, shall be legibly tagged with a durable, waterproof and weather-resistant label indicating the correct plant name and size specified in the plant list. Labels shall be securely attached and not be removed.

2.4 TOPSOIL

- A. Topsoil shall be a well-graded soil of good uniform quality. It shall be a natural, friable soil representative of productive soils in the vicinity. Topsoil shall be free of admixture of subsoil, foreign matter, objects larger than 25 mm (one inch) in any dimension, toxic substances, weeds and any material or substances that may be harmful to plant growth and shall have a pH value of not less than 5.0 nor more than 7.5.
- B. Obtain material from stockpiles established under Section 31 20 11, EARTH MOVING, subparagraph, Stripping Topsoil, that meet the general requirements as stated above. Amend topsoil not meeting the pH range specified by the addition of pH Adjusters.
- C. If sufficient topsoil is not available on the site to meet the depth as specified herein, the Contractor shall furnish additional topsoil. At least 10 days prior to topsoil delivery, notify the COE of the source(s) from which topsoil is to be furnished. Obtain topsoil from well drained areas. Additional topsoil shall meet the general requirements as stated above and comply with the requirements specified in Section 01 45 29, TESTING LABORATORY SERVICES. Amend topsoil not meeting the pH range specified by the addition of pH adjusters.

2.5 LIME

Lime shall be agricultural limestone containing not less than 90 percent calcium and magnesium carbonates. Lime must be ground to such a fineness that not less than 90% must pass No. 8 mesh and not less than 25% must pass No. 100 mesh. Moisture is not to exceed 10%.

2.6 SOIL CONDITIONERS

- A. Peat shall be a natural product of peat moss derived from a fresh-water site conforming to Fed. Spec. Q-P-166, except as otherwise specified. Peat shall be shredded and granulated to pass through a ½ inch mesh screen and conditioned in storage piles for at least six months after excavation.
- B. Coarse Sand
Coarse concrete sand, ASTM C-33 Fine Aggregate, shall be clean, sharp, free of limestone, shale and slate particles and of toxic materials.
- C. Organic Matter shall be commercially prepared compost, composted sufficiently to be free of all woody fibers, seeds, and leaf structures, and free of toxic and nonorganic matter.

- D. Fertilizer: Agricultural fertilizer of a formula indicated by the soil test. Fertilizers shall be organic, slow-release compositions whenever applicable

2.7 PLANTING SOIL MIXTURE

The planting soil mixture shall be composed of 2 parts topsoil, and 1 part peat.

2.8 BIOSTIMULANTS

Biostimulants shall contain soil conditioners, VAM fungi, and endomycorrhizal and ectomycorrhizal fungi spores and soil bacteria appropriate for existing soil conditions

2.9 PLANT FERTILIZER

- A. Provide plant fertilizer that is commercial grade and uniform in composition and conforms to applicable state and federal regulations.
- B. For new plant material, provide planting tablets: tightly compressed long-lasting, slow release fertilizer tablet weighing between 5 and 25 grams with a potential acidity of not more than 5% by weight and having an analysis of 20-10-5 (Nitrogen-Phosphoric-Potash), bearing the manufacturer's warranted statement of analysis. Analysis of available nutrients shall be: 20% Nitrogen (N) derived from urea-formaldehyde; 10% Phosphoric Acid (P_2O_5) derived from calcium phosphates; 5% Soluble Potash (K_2O) derived from potassium sulfate. 2.6% Combined Calcium (Ca) derived from calcium phosphates; 1.6% Combined Sulfur (S) derived from ferrous and potassium sulfates; 3.35% Iron (expressed as elemental Fe) derived from ferrous sulfate.

2.10 TURF FERTILIZER

- A. Provide turf fertilizer that is commercial grade, free flowing, uniform in composition, and conforms to applicable state and federal regulations. Granular fertilizer shall bear the manufacturer's warranted statement of analysis. Liquid starter fertilizer for use in the hydro seed slurry will be commercial type with 50 percent of the nitrogen in slow release form.
- B. Fertilizer shall having an analysis of 10-6-4 (Nitrogen-Phosphoric-Potash) containing a minimum available percentage by weight of 10% of Nitrogen (of which a minimum of 50%, in approved slow release form); 6% of Phosphoric Acid; 4% of Potash. Liquid starter fertilizer for use in the hydro seed slurry will be commercial type with 50 percent of the nitrogen in slow release form.

2.11 MEMBRANES

- A. Landscape Fabric shall be a spunbonded polyester fabric weighing 18 grams per square meter ($\frac{3}{4}$ oz per sq. yd) and with a 9,000 liter per minute flow rate per sq. meter (225 gal. per minute flow rate per sq. ft.)

2.12 MULCH

- A. Mulch shall be free from deleterious materials and shall be stored as to prevent inclusion of foreign material.
- B. Aggregate mulch materials shall be expanded shale in brown and grey colors and shall range in size from $\frac{3}{8}$ " to NO. 4 in accordance with ASTM C 136 and have a weight of 1325 pounds per cubic yard.
- C. Organic mulch materials shall be straw or double shredded hardwood:
 - 1. Straw for lawn seed bed mulch shall be stalks from oats, wheat, rye, barley, or rice that are free from noxious weeds, mold or other objectionable material. Straw shall be in an air-dry condition.
 - 2. Shredded hardwood shall be flayed, double shredded, aged for at least 3 months, of uniform color and texture and shall have a pH of not less than 4.5 to 5.0.

2.13 TREE WRAP

- A. Crinkle Paper Tree wrap shall be two thicknesses of crinkled paper cemented together with a layer of bituminous material. Wrapping material shall be a minimum of 100 mm (4 inches) in width and have a stretch factor of $33\frac{1}{3}$ percent. Twine for tying shall be lightly tarred medium or coarse sisal yarn.
- B. Tree wrap shall be secured to the trunk using bio-degradable tape suitable for nursery use and which is expected to degrade in sunlight in less than two years after installation

2.14 STAKES AND GUYING WIRES

- A. Provide stakes for tree support of rough sawn wood, free from knots, rot, cross grain, or other defects that would impair the strength. Stakes shall be a minimum of 50 mm by 50 mm (2 inches by 2 inches) by 2400 mm (8 feet) long and pointed at one end.
- B. Guying wire shall be 2.7 mm (12 gage) annealed galvanized steel.
- C. Hose chafing guards shall be new or used 2-ply reinforced rubber or plastic hose of all the same color on the project.
- D. Flags to be fastened to guys shall be surveyor's plastic tape, white in color and 150 mm (6 inches) in length.

- E. Guying cable shall be a minimum of five strand twisted, 5 mm (3/16 inch) diameter steel cable.
- F. Turnbuckles shall be galvanized or cadmium plated and have a 75 mm (3 inch) minimum lengthwise opening fitted with screw eyes.
- G. Eye bolts shall be galvanized or cadmium plated having a 50 mm (one inch) diameter eye with a minimum screw length of 40 mm (1-1/2 inches).
- H. Deadmen shall be 100 mm by 200 mm (4 inch by 8 inch) rectangular, or 200 mm (8 inch) diameter by 900 mm (36 inch) long sound wood.
- I. Arrow shaped or auger iron anchors shall be noncorrosive, and sized according to the manufacturer's recommendation.

2.16 EDGING

Metal edging shall be aluminum with slots provided for stakes and shall be 5 mm (3/16 inch) thick by 10 mm (4 inches) deep in standard lengths. Steel edging shall be treated with a coating and factory finished black in color. Anchoring stakes shall be of similar material and 400 to 450 mm (16 to 18 inches) long and tapered.

2.17 WATER

Water shall not contain elements toxic to plant life. During installation of plant materials, it shall be obtained as specified in Section 01 00 00, GENERAL REQUIREMENTS, paragraph, Availability and Use of Utility Services at no cost to the Contractor.

2.18 ANTIDESICCANT

Antidesiccant shall be an emulsion specifically manufactured for agricultural use that will provide a protective film over plant surfaces permeable enough to permit transpiration.

2.19 SEED

Seed shall be state-certified seed of the latest season's crop and shall be delivered in original sealed packages bearing the producer's warranted analysis for percentages of mixtures, purity, germination, weed seed content, and inert material. Seed shall be labeled in conformance with U. S. Department of Agriculture rules and regulations under the Federal Seed Act and applicable state seed laws. Seed that has become wet, moldy, or otherwise damaged will not be acceptable. Onsite seed mixing shall be done only in the presence of the COE. Seed mixtures shall be proportioned by weight as follows:

NAME OF GRASS
(Common)

Percent by Weight

| | |
|-------------------------------|-----|
| Pennlawn Red Fescue | 20% |
| Kentucky Blue Grass | 60% |
| Manhattan Perennial Rye Grass | 40% |

| <u>Percent Germination</u> | <u>Maximum Percent Weed Seed</u> |
|----------------------------|----------------------------------|
| 98% | 90% |
| 98% | 80% |
| 98% | 90% |

2.20 SOD

Sod shall be nursery grown certified sod as classified in the TPI Guideline Specifications to Turfgrass Sodding. The composition of the grass species in the sod shall be as follows:

| (Common Name) | (Percent) |
|---------------------|-----------|
| Kentucky Blue Grass | 86% |
| Creeping Red Fescue | 14% |

Quality shall conform to ASPA Guideline Specifications for Sodding.

2.21 HERBICIDES

All herbicides shall be properly labeled and registered with the U.S. Department of Agriculture. Keep all herbicides in the original labeled containers indicating the analysis and method of use.

PART 3 - EXECUTION

3.1 LAYOUT

Stake plant material locations and bed outlines on project site for approval by the COE before any plant pits or beds are dug. The COE may approve adjustments to plant material locations to meet field conditions.

3.2 EXCAVATION FOR PLANTING

- A. Prior to excavating for plant pits and bed, verify the location of any underground utilities. Damage to utility lines will be repaired at the Contractor's expense. Where lawns have been established prior to planting operation, cover the surrounding turf before excavations are

made in a manner that will protect turf areas. Barricade existing trees, shrubbery, and beds that are to be preserved in a manner that will effectively protect them during the project construction.

- B. Remove rocks and other underground obstructions to a depth necessary to permit proper planting according to plans and specifications. Where underground utilities, construction, or solid rock ledges are encountered, the COE may select other locations for plant material.
- C. Dig plant pits by any approved method so that they have sides and bottoms to the sizes shown on detailed drawings. When pits are dug with an auger and the sides of the pits become glazed, scarify the glazed surface. Size the plant pits shall be as shown on detailed drawings, the minimum allowable dimensions of plant pits shall be regardless of width, 150 mm (6 inches) deeper for shrubs and 225 mm (9 inches) deeper for trees than the depth of ball or root spread; for ball or root spread up to 600 mm (2 feet), pit diameters shall be twice the ball or root spread; for ball or root spread from 600 to 1200 mm (2 to 4 feet), pit diameters shall be 600 mm (2 feet) greater; for ball or root spread over 1200 mm (4 feet), pit diameters shall be 1-1/2 times the ball or root spread.
- D. Where ground cover and planting beds occur in existing turf areas, remove turf to a depth that will ensure the removal of the entire root system, with additional bed preparation as specified in the next paragraph.
- E. Where existing soil is to be used in place, till new ground cover and plant beds to a depth of 100 mm (4 inches). Spread peat soil amendment uniformly over the bed to depth of 50 mm (2 inches) and thoroughly incorporate it into the existing soil to a depth of 100 mm (4 inches) using a roto-tiller or similar type of equipment to obtain a uniform and well pulverized soil mix. During tillage operations, remove all sticks, stones, roots, and other objectionable materials. Bring plant beds to a smooth and even surface conforming to established grades.
- F. In areas of new grading where existing soil is being replaced for the construction of new ground cover and plant beds, remove 100 mm (4 inches) of existing soil and replace with topsoil. Plant beds shall be brought to a smooth and even surface conforming to established grades. Till 50 mm (2 inches) of peat soil amendment into the topsoil as specified.

- G. Using topsoil, form earth saucers or water basins for watering around plants. Basins to be 2" high for shrubs and 4" high for trees.
- H. Treat plant saucers, shrub, and ground cover bed areas, prior to mulching, with an approved pre-emergent herbicide. Plant ground cover in areas to receive erosion control material through the material after material is in place.

3.3 SETTING PLANTS

- A. Handle balled and burlapped and container-grown plants only by the ball or container. Remove container-grown plants in such a way to prevent damage to plants or root system. Treat plant balls and containerized root systems as shown on detailed drawings. Set plants plumb and hold in position until sufficient soil has been firmly placed around the roots or ball. Set plants so that the root crown is 1/2" higher than the surrounding grade. Plant ground cover plants after the mulch is in place. Avoid contaminating the mulch with the planting soil. Add slow release packet, tablet or pellet fertilizer as each plant is installed as per manufacturer's recommendation for method of installation and quantity.
- B. Backfill balled and burlapped and container-grown plants with planting soil mixture as specified on detailed drawings to approximately half the depth of the ball and then tamp and water. For balled and burlapped plants, carefully remove excess burlap and tying materials and fold back. Tamp and water remainder of backfill Planting Soil Mixture; then form earth saucers or water basins around isolated plants with topsoil.
- C. Plant bare-root stock arranging the roots in a natural position. Remove damaged roots with a clean cut. Carefully work Planting Soil Mixture in among the roots. Tamp and water the remainder of Planting Soil Mixture; then form earth saucers or water basins around isolated plants with topsoil.

3.4 TRUNK WRAPPING

Wrap the trunks of deciduous trees immediately after planting. Wrap the trunks of deciduous trees, 40 mm (1-1/2 inches) or greater in caliber with the specified material beginning at the base and extending to the first branches. Remove wrapping after one year. When using Crinkled Paper Wrap, securely tie wrapping at the top and bottom and at 450 mm (18 inch) maximum intervals with twine.

3.5 STAKING AND GUYING

- A. Stake and guy plants as shown on the drawings and as specified.

SPEC WRITER NOTE: Omit following methods
not utilized.

- B. Drive stakes vertically into the ground to a depth of 800 to 900 mm (2-1/2 to 3 feet) in such a manner as not to injure the ball or roots, unless otherwise shown on the drawings.
- C. Place deadmen not less than 450 mm (18 inches) below the surface of the ground, unless otherwise shown on the drawings.
- D. Install iron anchors according to manufacturer's recommendations.
- E. Fasten flags securely on each guy wire or cable approximately 2/3 of the distance up from ground level.
- F. Remove stakes and guy wires after one year.

3.6 EDGING PLANT BEDS

- A. Uniformly edge beds using a sharp tool to provide a clear cut division line between the planted area and the adjacent lawn.
- B. Install metal edging materials in accordance with manufacturer's recommendations and as shown on the plans.

3.7 MULCHING PLANTS

- A. Mulch within 48 hours after planting and applying a pre-emergent herbicide. Do not mulch in ground cover areas that shall have organic material placed before planting.
- B. Placing Inert Material: Place landscape fabric with edges lapped 150 mm to 300 mm (6 inches to 12 inches) to receive inert mulch material. Spread inert mulch to a uniform thickness of 3" over the membrane as shown.
- C. Placing Organic Material: Spread a mulch of double-shredded hardwood to a uniform minimum thickness of 50 mm (2 inches).
- D. Keep mulch out of the crowns of trees and shrubs and off buildings, sidewalks, light standards, and other structures.

3.8 PRUNING

- A. Prune new plant material in the following manner: Remove dead, broken and crossing branches. Prune deciduous trees and shrubs to reduce total amount of anticipated foliage by 1/4 to 1/3 while retaining typical growth habit of individual plants with as much height and spread as is practicable. Make cuts with sharp instruments as close as possible to the branch collar. Do not make flush cuts. Do not make "Headback" cuts at right angles to line of growth. Do not pole trees or remove the leader. Remove trimmings from the site. Paint cuts 13 mm (1/2 inch) in diameter and larger with the specified tree wound dressing.

3.9 TILLAGE FOR TURF AREAS

Thoroughly till the soil to a depth of at least 100 mm (4 inches) by scarifying, disking, harrowing, or other approved methods. This is particularly important in areas where heavy equipment has been used, and especially under wet soil conditions. Remove all debris and stones 25 mm (one inch) or larger remaining on the surface after tillage in preparation for finish grading. To minimize erosion, do not till areas of 3:1 slope ratio or greater. Scarify these areas to a 50 mm (one inch) depth and remove debris and stones.

3.10 FINISH GRADING

After tilling the soil for bonding of topsoil with the subsoil, spread the topsoil evenly to a minimum depth of 6 inches. Incorporate topsoil at least 50 to 75 mm (2 to 3 inches) into the subsoil to avoid soil layering. Do not spread topsoil when frozen or excessively wet or dry. Correct irregularities in finished surfaces to eliminate depressions. Protect finished topsoil areas from damage by vehicular or pedestrian traffic. Complete lawn work only after areas are brought to finished grade.

3.11 APPLICATION OF FERTILIZER AND LIME FOR TURF AREAS

- A. Apply turf fertilizer at the rate of 25 pounds per 1,000 square feet. In addition, adjust soil acidity and add soil conditioners as required herein for suitable topsoil under PART 2, Paragraph, TOPSOIL.
- B. Spread lime at the rate of as recommended by soil analysis.
- C. Incorporate fertilizers and lime into the soil to a depth of at least 100 mm (4 inches) as part of the finish grading operation. Immediately restore the soil to an even condition before any turf work.

3.12 MECHANICAL SEEDING

- A. Broadcast seed by approved sowing equipment at the rate of 6 pounds per 1,000 square feet. Sow one half of the seed in one direction, and the remainder sown at right angles to the first sowing. Cover seed to an average depth of 6 mm (1/4 inch) by means of spike-tooth harrow, cultipacker, or other approved device.
- B. Immediately after seeding, firm up the entire area with a roller not exceeding 225 kg/m (150 pounds per foot) of roller width. Where seeding is performed with a cultipacker-type seeder or where seed is applied in combination with hydro-mulching, no rolling is required.
- C. Immediately after preparing the seeded area, evenly spread an organic mulch of straw by hand or by approved mechanical blowers at the rate of

0.5 kg/m² (2 tons per acre). Application shall allow some sunlight to penetrate and air to circulate but also reduce soil and seed erosion and conserve soil moisture. Anchor mulch by either a mulch tiller, asphalt emulsion, twine, or netting. When asphalt emulsion is used, apply either simultaneously or in a separate application. Take precautionary measures to prevent asphalt materials from marking or defacing structures, pavements, utilities, or plantings.

3.13 SODDING

- A. Accomplish sodding in accordance with the ASPA Guideline Specifications for sodding. Lay sod at right angles to slope or the flow of water. On slope areas, start at the bottom of the slope.
- B. After completing the sodding operation, blend the edges of the sodded area smoothly into the surrounding area.

3.14 WATERING

Apply water to the turf areas immediately following installation at a rate sufficient to ensure thorough wetting of the soil to a depth of at least 100 mm (4 inches). Supervise watering operation to prevent run-off. Supply all pumps, hoses, pipelines, and sprinkling equipment. Repair all areas damaged by water operations.

3.15 PROTECTION OF TURF AREAS

Immediately after installation of the turf areas, protect against traffic or other use by erecting barricades, as required, and placing approved signs at appropriate intervals until final acceptance.

3.16 RESTORATION AND CLEAN-UP

Where existing or new turf areas have been damaged or scarred during planting and construction operations, restore disturbed area to their original condition. Keep at least one paved pedestrian access route and one paved vehicular access route to each building clean at all times. In areas where planting and turf work have been completed, clear the area of all debris, spoil piles, and containers. Clear all other paved areas when work in adjacent areas is completed. Remove all debris, rubbish and excess material from the station.

3.17 ENVIRONMENTAL PROTECTION

All work and Contractor operations shall comply with the requirements of Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.

- - - E N D - - -